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SYMPOSIUM ON HORMONES

COMPLICATIONS OF THYROID-SUBSTITUTION THERAPY*

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Preparations of endocrine glands in the form of crude extracts or purified synthetic active principles may be classified from a pharmacological viewpoint as drugs of animal origin. Whereas most drugs are substances foreign to the body, the hormones are normally present and active in tissues where they have a physiological function. For this reason there is some tendency to place hormones in a different category from drugs. There is no valid reason for this, however, and indeed the older endocrine preparations have unobtrusively broken down this arbitrary distinction. For example, epinephrine is much more frequently viewed as a powerful sympathomimetic drug than as the hormone of the adrenal medulla.

The fact that the drugs of endocrine origin do have a physiological function has aided considerably in the elucidation of their mechanisms of action. A drug foreign to the body can only be studied with respect to its positive effects after administration. Observations on the response to a deficiency or an excess of a hormone can be made both in the clinic and in the laboratory. With this dual investigative method, much has been learned concerning the mechanisms of action of the hormones. Despite the extensive physiological and pharmacological evidence available, the endocrine preparations are probably more often misused in therapy than any other group of drugs. Extravagant claims are often made for their efficacy, and they are widely employed in conditions entirely unrelated to hormonal deficiency. Routes of administration are frequently used which preclude the possibility of obtaining pharmacodynamic action. Rational therapeutic employment of drugs of endocrine origin clearly depends on a thorough knowledge of their chemistry, and of their physiological and pharmacological actions.

Goodman and Gilman[1]

ALTHOUGH thyroid substitution therapy is one of the best known and most reliable types of endocrine treatment, a number of features concerning it are apt to be overlooked in the course of a busy practice. These involve not only certain therapeutic hazards that attend the use of this medication, but also neglected opportunities for permanent good. The thyroid hormone has two main effects: first, that of growth and maturation and, secondly, that of the release of energy. The physician must take advantage of these properties, while avoiding their undesirable features. In this respect, the wise use of thyroid medication requires a considerable acquaintance with the art of medicine.

TYPE OF THERAPY

For most purposes, desiccated thyroid — thyroid *U. S. P.* — is to be preferred to any other type of thyroid preparation, because in general it is cheaper and because its assimilation is better assured. Thyroxin crystals are so insoluble that they may pass through the gastrointestinal tract with little if any absorption, and at best the degree of absorption is frequently unreliable, even when the crystals are administered in solution. Therefore, thyroxin *U. S. P.* should ordinarily be given only by the parenteral route, either when difficulty in absorption by the intestine is anticipated or when, for scientific or other reasons, it is desirable to know definitely how much of the drug reaches the circulation. Such conditions might involve massive edema of the intestine, ulcerative lesions or even steatorrhea. Likewise, very rarely, protein sensitivity may lead to allergic symptoms like urticaria, which preclude the use of glandular preparations. If thyroxin is given, it should be dissolved in dilute alkali (N/100) and further diluted (N/1000) just before injection. Ordinarily, however, both for the treatment of frank myxedema and for other therapeutic purposes, one should employ desiccated thyroid, usually in tablets containing 1 gr. (60 mg.) of the material, commonly given twice daily.

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Therapeutic Hazards

In the treatment of myxedema, care must be exercised, particularly in older people, lest the reserve of certain organs be overtaxed. These include especially the heart and the adrenal cortex. The danger of precipitating acute dilatation of the heart, with left-sided failure, acute pulmonary edema, anginal seizures and even coronary thrombosis, has often been commented on,[2] and need not be amplified further. Less well known is the precipitation of acute shock, Addisonian in type, in a disorder that Means et al.[3] have classified as "hypothyroidism masquerading as myxedema." Many endocrinologists would consider this type an early stage of Simmonds's cachexia, in which thyroid lack had become more prominent than disturbances in the other endocrines. Such cases, however, can be verified properly if special attention is paid to points in the history that suggest hypogonadism and the symptoms and signs of Addison's disease. The presumptive diagnosis can be verified by the appropriate use of insulin-tolerance and glucose-tolerance tests.[4] Obviously, such a case must be treated with thyroid only under hospital control and with extreme care.

The dosage tolerated by a patient with classic myxedema varies with the patient's age. Many young patients (under twenty years of age) tolerate without difficulty as much as 4 gr. a day of thyroid *U. S. P.*, although this dosage is not to be recommended routinely. On the third to the fifth day of treatment, they may experience a certain amount of mild fever and muscle pain of minor character; otherwise, little discomfort results. Under such dosage, the patient's metabolism usually reaches –10 per cent in two weeks, and if the dosage is continued, it slowly rises to normal in a month after the beginning of therapy. Older people must be treated more cautiously, even in the absence of definite heart disease. Thyroid is in itself, of course, a diuretic, and at all levels of metabolism will produce a certain degree of diuresis unless heart failure is precipitated, when the diuresis may be masked by increasing edema due to heart disturbance.

As pointed out by Goodman and Gilman[5] and others, ½ gr. a day will, in the course of a month, bring the metabolism up to –35 per cent, 1 gr. to –25 per cent, 2 gr. to –15 per cent, and 3 gr. to –10 per cent. Equivalent dosage for thyroxin has been given by Thompson and his associates.[6] With this approximate scheme in mind, one may start in with ½ gr. a day for ten days, and slowly elevate the dosage each week as required. Usually, not more than 2 gr. (120 mg.) daily suffices.

Some patients must be content with a subnormal level because their hearts do not tolerate a normal metabolic rate without the onset of cardiac failure or of angina pectoris. In general, the basal metabolic rate may be as low as –20 per cent before the layman can detect a difference in the patient's appearance or personality. Indeed, the patient sometimes prefers this level because he finds life far less worrisome.

In cretins, adjustment of the dose is particularly precarious because there seems to be a rather narrow margin of safety between an inadequate dose and one that produces violent mental symptoms.[7] Indeed, in untreated cretins over fifteen years of age, there is a prevailing sentiment that treatment may often be worse than useless because it merely makes the patient unhappy and intolerable to other members of society. In juvenile myxedema, this limitation is less disturbing, and for the sake of the general development and growth of such young people, it is desirable to run them constantly with a somewhat elevated metabolism. In fact, it is surprising how content very young people can be for long periods with a basal metabolic rate that is close to +20 per cent. Accordingly, children often well tolerate doses ordinarily given to adults.* On the contrary, an old person frequently complains bitterly at a level of +5 per cent.

If dosage is pushed too high in women in the childbearing age, scanty or irregular menstruation may result. On the other hand, thyroid therapy in mild myxedema may correct menorrhagia and metrorrhagia; and in profound myxedema, minimal thyroid therapy may initiate regular menstrual periods that have been stopped for some years because of thyroid lack.[9] One thus sees a reversal of the effect of thyroid on menstruation, that is, no periods at a basal metabolic rate of –45 per cent, menorrhagia at –20 per cent, oligomenorrhea at +15 per cent and, possibly, no periods at +50 per cent.

Even when too little thyroid secretion is present, as in myxedema, the patient may complain of nervousness, and occasionally hyperthyroidism may be suspected. This paradoxical nervousness or irritability of the hypothyroid patient may be a frustration complex analogous to that shown by older men engaged in mass production who are no longer able to maintain the speed of the assembly line. These myxedematous patients are

*Means[8] has recommended the following dosage of thyroid *U. S. P.* in the treatment of cretins:

Age	Daily Dosage
2 to 4 mo.	6 mg. (1/10 gr.)
4 to 8 mo.	12 mg. (1/5 gr.)
8 to 12 mo.	18 mg. (3/10 gr.)
12 to 24 mo.	24 to 45 mg. (2/5 to 3/4 gr.)
2 to 4 yr.	30 to 90 mg. (½ to 1½ gr.)
4 to 12 yr.	60 to 180 mg. (1 to 3 gr.)

usually content until their neighbors begin to push them, when they become harassed and irritable. With moderate thyroid dosage, they live faster and can maintain the pace of modern life. On the other hand, excessive overdosage may lead to violent maniacal attacks, accompanied by a flight of ideas and even incoherent bawling, with intermittent echolalia, babbling and other psychic phenomena. In general, these attacks are likelier to be precipitated by rapid elevation of the basal metabolic rate than by slow elevation. Of course, myxedematous patients are more sensitive to high doses of thyroid than persons whose glands are normal.

Other bodily functions may be accentuated unpleasantly by overdosage of thyroid. Among these abnormalities are diarrhea produced by increased thyroid activity, excessive sweating, palpitation and restlessness to the point of apprehension. Occasionally, particularly in older people, auricular fibrillation may be precipitated by the use of too much thyroid, and normal cardiac rhythm may be resumed when this medication is stopped. This phenomenon is not infrequently encountered in weight reduction, when an overenthusiastic patient "doubles the dose." In the absence of frank circulatory or arteriosclerotic disease, and in the presence of a normal thyroid gland, it is probably rare to see very alarming symptoms until the dose exceeds 2 gr. (120 mg.) a day. In general, of course, the same rule holds for thyroid as for many other drugs, namely, that the law of diminishing returns applies. If the patient is truly hypothyroid, a relatively small dose will produce a marked effect on the metabolic turnover, whereas if the patient is suffering from reduced metabolism due to some other cause, rather large doses may be required to produce any considerable effect on the metabolic rate. Indeed, some clinicians go so far as to say that there is little point in giving over 3 gr. (180 mg.) daily.

This therapeutic test may be applied in cases of nephrosis and of hypogonadism (hypopituitarism) or in cases of so-called "substandard" (but normal) basal metabolic rate. This last group is particularly interesting because it comprises that end of the distribution of the healthy population whose basal metabolism under normal conditions happens to lie between –15 and –25 per cent. Such cases are not infrequently branded as hypothyroid on the basis of the metabolic-rate determination, and treated unnecessarily. Indeed, they may erroneously be called "myxedema," when actually that term should be reserved for the characteristic clinical syndrome recognizable at the bedside. In case of doubt, chemical determination of the plasma protein-bound iodine[23] is a highly reliable confirmatory test.

In the minor degrees of true hypothyroidism, however, the patient may often be benefited symptomatically by thyroid, and the experienced practitioner is justified in trying the therapeutic effect in certain cases of borderline endocrine imbalance in which mild stigmas of thyroid underfunction seem to be prominent. This is true even though the basal metabolic rate lies within normal limits. Occasionally, although somewhat uncommonly, doses as high as 5 gr. a day may be necessary in young people. Farquharson and Squires[10] have pointed out, however, that when medication is stopped in such patients the basal metabolic rate may fall abruptly to markedly subnormal levels, and that it returns to normal only gradually, even when high-calorie diets are supplied.

In other endocrine deficiencies, the use of thyroid may upset the endocrine balance disadvantageously. For example, mild diabetes mellitus may be aggravated,[11] or mild tetany may be enhanced. On the contrary, it is well substantiated that in lack of pituitary or ovarian secretion, thyroid therapy may increase the efficiency of small amounts of growth hormone or gonadotropic hormone reaching the peripheral tissues; and in young, undeveloped patients the use of thyroid alone in rather large doses may suffice to promote adequate growth and maturation. Such therapy, of course, should be persisted in only after chronic systemic disease, such as tuberculosis or nephritis, has been ruled out, because under such circumstances the increase in caloric turnover would only add insult to injury. Occasionally, in hospital practice, one finds a renal dwarf whose condition has been made worse by an ill-founded hope of stimulating growth by thyroid therapy.

In addition to these precautions, there remains a large group of borderline or twilight conditions in which no clean-cut syndrome can be diagnosed, but in which the patient responds far more strikingly to thyroid therapy than he would respond to placebos. Such symptoms as lassitude, overweight, inability to think and mild mental depression may in properly selected cases be benefited by thyroid, judiciously administered. Even obstinate constipation, based on mild hypothyroidism, may in itself justify such treatment. The dosage required for this type of therapy is often rather large and should not be persisted in without due precautions. A striking example of the abuse of this type of therapy has been reported by Richardson[12] in anorexia nervosa, a disease that occurs generally in young women suffering from a morbid desire for reduction of weight, even to

the point of emaciation. Because their basal metabolic rate is frequently under −25 per cent, the practitioner is tempted to give thyroid, especially in the hope that it may stimulate appetite. Such therapy only increases the emaciation and the mental agitation of the patient, and may be responsible in part for the not infrequently fatal outcome in such cases.

Neglected Opportunities

Whenever one encounters a patient suffering from cretinism or juvenile myxedema who has the physical appearance and mental status of a child, although mature in years, one realizes that such a patient represents a gross failure in therapy based on neglect. Such patients are likely to live many decades as a sad reminder of the fact that, had proper treatment been pursued consistently, they might have become useful citizens. In treating cretins or patients with juvenile myxedema, therefore, it is particularly important to begin early and to maintain active therapy continuously for many years. With present-day standards of therapy, however, the cretin has only about an even chance of mental development beyond an I. Q. of 60, whereas nearly all cases of juvenile myxedema attain this level of intelligence.[13] This difference presumably reflects the lack of iodine or thyroid hormone experienced by the cretin during intrauterine life, as witnessed by the presence of cretinoid goiter at birth. With better therapy, persistently adhered to, Rolleston[14] believes the prognosis to be correspondingly brighter.

All intergrades exist in degrees of thyroid lack, ranging from the striking imbecilic dwarf to young people who do not have quite enough thyroid secretion to enable them to grow up physically and mentally. Some patients with delayed puberty, for example, may require merely extra thyroid hormone to increase their stature and to facilitate sexual maturity. When treated with rather large doses of thyroid for several years, such persons may grow many inches in height and undergo a complete change in personality. Such a case has been reported in detail by Zondek.[15] The obscurity of these early hypothyroid problems is illustrated by a case seen recently at the Boston City Hospital.

A 14-year-old schoolboy was referred for study with a chief complaint of enuresis. The past history was negative except for measles and chicken pox in early childhood. He had always been active and well, although a trifle small for his age and slightly backward in school. His father was somewhat perturbed at his immaturity and lack of interest in the opposite sex.

On physical examination, the patient was found to be poorly developed and moderately well nourished. The scapulas tended toward the "wing" position. There was moderate left dorsal scoliosis. The external genitalia were those of a boy of 10. The testes were descended, and about 1.5 by 1.0 cm. in size. Pubic and axillary hair was absent. The skin was somewhat dry, but not cold. The pulse rate was 70. The weight was 8 pounds under standard, according to Bardeen's tables.[16] X-ray study showed epiphyseal ossification at least 1 year delayed. The basal metabolic rate was −13 per cent by the Boothby–Sandiford modification of the Dubois standards. The plasma protein-bound iodine was 3.7 microgm. per 100 cc., that is, the level found in incipient myxedema in the adult. The 17-ketosteroid excretion for 24 hours was somewhat subnormal for his age.

The patient was placed on thyroid *U.S.P.*, beginning with ½ gr. and increasing cautiously to 3 gr. daily. Special care with the diet was advised, and general hygiene instituted.

Obviously, this therapy must be undertaken before the epiphyses have finally closed, and it must be accompanied by appropriate supportive measures, such as general hygiene and good diet, and often with a certain amount of psychiatric or social adjustment. Frequently, too, other hormones may be supplied to advantage, but it is sometimes surprising how much the addition of thyroid alone will accomplish. Thus, Foster and Thornton[17] have successfully used thyroid in the treatment of menstrual irregularity in certain groups of cases. There is ample scientific background for this therapy apart from clinical experience, because it has been demonstrated clearly that the peripheral tissues utilize small amounts of growth hormone[18] and of sex hormone more effectively when adequate thyroid secretion is present. Indeed, hens lay more eggs[19] and cows give more milk[20] under similar circumstances. In the use of such therapy, due consideration should be given not only to the normal growth curve of the patient in question, estimated both in the light of standard statistics, such as those of the standard tables of Bardeen,[16] but also to the patient's forebears.

At present, too much attention is paid to the basal metabolic rate in the control of therapy. This is a useful objective method of deciding whether the patient needs more or less medicine, but the controlling factor ordinarily is the patient's own physiologic state. Barring untoward effects of troublesome degree, the patient should receive enough medicine to rectify the complaint. This is merely common sense, but it is often lost sight of in routine therapy. In general, the more the drug is needed, the lower the dose required to rectify the disorder.

Certain cases of mistaken diagnosis may sometimes be disclosed by a sluggish response to thyroid therapy. For example, loss of hair from natural causes may occasionally be mistaken for evidence of hypothyroidism, or chapping of the skin

and lips in winter due to alkaline soaps or to vitamin deficiency may similarly be misinterpreted. In the dry eczema of old people, however, the so-called "eczema hiemalis," the judicious use of thyroid may lead to increased sweating and secretion of the sebaceous glands sufficient to make tolerable an annoying condition. When such therapy is undertaken in older people, of course, particularly during cold weather, there is always a certain risk of overstraining the heart.

New Problems

In recent years, special interest has been focused on cases of Graves's disease without hyperthyroidism, exhibiting the syndrome that Brain[21] has termed "exophthalmic ophthalmoplegia." Such patients as a general rule do not have an abnormally high basal metabolic rate; indeed, they may show a subnormal basal metabolic rate, especially if they have been treated previously by subtotal thyroidectomy. A high concentration of thyrotropic hormone is usually found in the urine, unlike that of classic hyperthyroidism. The average surgeon is tempted in such cases to operate a second time and remove more of the gland, but accumulating experience indicates that this merely exaggerates the disturbance. At the present time, one useful method of therapy seems to be that of rather high dosage of thyroid, usually combined with iodine.[22] The large doses of thyroid, of course, elevate the basal metabolic rate, and such patients must pay for the preservation of their eyesight by a certain number of months of artificial hyperthyroidism, exogenous in origin. It may even be necessary to use repeated injections of thyroxin in solution by vein, but this situation is very rare and such treatment should be carried out only in a hospital. Under favorable circumstances, thyroid therapy may check the advancing exophthalmos and may eventually lead to satisfactory recession of the globe. In the course of such a program, due consideration must obviously be given to the cardiac status and similar variables. In my experience in a large hospital, this group has comprised over one tenth of the cases in which the thyroid status has been questioned.[23] Some of them were patients who had once been operated on and who returned because of recurrent nervousness and prominence of the eyes, often asymmetrical.

It is not generally realized that many routine cases of Graves's disease show moderate increase in exophthalmos after thyroidectomy if careful measurements are made. Indeed, most clinicians believe the reverse to be true, because this increased exophthalmos is obscured by the return of the upper eyelid to its normal position. It seems likely that the cases of malignant exophthalmos are simply extreme examples of a mechanism that occurs generally.

If the protein-bound iodine is determined in the plasma of these patients before any iodine therapy has been used, it is frequently found to be normal.[24] Furthermore, if iodine therapy is given to such patients in large doses, the basal metabolic rate frequently falls to definitely subnormal levels. It has been suggested, however, that thyroid therapy, alone or combined with iodine, is often the procedure of choice, for reasons already described.

These questions also bear on the general problem of hyperthyroidism, because in cases of chronic Graves's disease of more than a year's standing, there is now some question of the best mode of therapy. In many of these patients, the iodine metabolism seems to be at approximately normal levels, perhaps because the thyroid's reserve of iodine has been exhausted. Nevertheless, in patients subjected to subtotal thyroidectomy, the disease is prone to recur. For this reason, Lahey and his colleagues[25] have recommended a radical resection under these circumstances. The tentative opinion has also been advanced by other workers that iodine therapy in these cases may supply the raw material for a renewed outpouring of thyroid hormone in great excess. Still other clinicians fear that ultimate cardiac decompensation will take a heavy toll if nearly all cases showing even mild symptoms are not operated on. Obviously, the final word cannot be stated at present about this special group of cases. It may, however, be a useful confirmatory test to find that the plasma protein-bound iodine before therapy is normal even though the apparent basal metabolic rate may be somewhat increased.[24] Should these cases, carefully selected, receive thyroid medication?

Another point of interest that requires further clinical experience is the use of commercial thyroid preparations in older patients with hypothyroidism and in those with frank cardiovascular disease. Meyer and Yost[26] have presented evidence that preparations of the whole gland may contain an unidentified material that accelerates heart action far in excess of the actual effect of the thyroid hormone itself. Indeed, they have fractionated such glandular preparations into one extract, which contains the thyroid hormone, and another, which contains the excessive cardioaccelerating material without the thyroid hormone. At present, more clinical experience is needed to determine the value of these findings, but already it seems possible that such an untoward effect may be avoided by using iodinated serum protein[27] in lieu of actual thyroid material.

The same thing may be said of certain purified

thyroid fractions now available commercially. In the treatment of cases subject to anginoid attacks, this point merits careful study.

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In summary, then, one should take advantage of the two properties of the thyroid hormone, namely, its maturing and its calorigenic effects, in rectifying disturbances in endocrine imbalance. In so doing, one must not fail to take advantage of the early years of life if growth and development are in question. In the later years of life, on the other hand, one must be careful not to outstrip the functional reserve of any organ or system in the body. It must always be remembered that all the endocrines are in league with one another, and that a change in thyroid balance alters pituitary, ovarian and adrenal function. Some of the symptoms of overdosage are usually mere nuisances, like diarrhea or oligomenorrhea. Others, such as the precipitation of heart failure or of Addisonian shock, may be rapidly fatal.

References

1. Goodman, L., and Gilman, A. *The Pharmacological Basis of Therapeutics.* 1383 pp. New York: Macmillan Co., 1941. P. 1156.
2. Means, J. H., White, P. D., and Krantz, C. I. Observations on the heart in myxedema, with special reference to dilatation and angina pectoris. *Boston M. & S. J.* **195**:455-460, 1926.
3. Means, J. H., Hertz, S., and Lerman, J. The pituitary type of myxedema or Simmonds' disease masquerading as myxedema. *Tr. A. Am. Physicians* **55**:32-53, 1940.
4. Fraser, R., Albright, F., and Smith, P. H. Carbohydrate metabolism: the value of the glucose tolerance test, the insulin tolerance test, and the glucose-insulin tolerance test in the diagnosis of endocrinologic disorders of glucose metabolism. *J. Clin. Endocrinol.* **1**:297-306, 1941.
5. Goodman and Gilman.[1] P. 1167.
6. Thompson, W. O., Thompson, P. K., Brailey, A. G., and Cohen, A. C. The calorigenetic action of thyroxin at different levels of basal metabolism in myxedema. *J. Clin. Investigation* **7**:437-463, 1929.
7. Higgins, H. L. Two cases of dwarfism. *New Eng. J. Med.* **214**:148-150, 1936.
8. Means, J. H. *The Thyroid and Its Diseases.* 602 pp. Philadelphia: J. B. Lippincott Co., 1937. P. 277.
9. Haines, S. F., and Mussey, R. D. Certain menstrual disturbances associated with low basal metabolic rates without myxedema. *J. A. M. A.* **105**:557-560, 1935.
10. Farquharson, R. F., and Squires, A. H. Inhibition of the secretion of the thyroid gland by continued ingestion of thyroid substance. *Tr. A. Am. Physicians* (in press).
11. Wilder, R. M. Hyperthyroidism, myxedema and diabetes. *Arch. Int. Med.* **38**:736-760, 1926.
12. Richardson, H. B. Simmonds' disease and anorexia nervosa. *Arch. Int. Med.* **63**:1-28, 1939.
13. Goodkind, R. P.: cited by Means.[8] P. 279.
14. Rolleston, H. Prognosis in cretinism. *Lancet* **2**:372, 1934.
15. Zondek, H. *The Diseases of the Endocrine Glands.* Third edition. 492 pp. Baltimore: William Wood & Co., 1936.
16. Bardeen, C. R.: cited by Sevringhaus, E. L. *Endocrine Therapy in General Practice.* Third edition. 238 pp. Chicago: Year Book Publishers. 1940.
17. Foster, R. C., and Thornton, M. J. Thyroid in the treatment of menstrual irregularities. *Endocrinology* **24**:383-388, 1939.
18. Evans, H. M., Simpson, M. E., and Pencharz, R. I. Relation between the growth promoting effects of the pituitary and the thyroid hormone. *Endocrinology* **25**:175-182, 1939.
19. Winchester, C. F. Influence of thyroid on egg production. *Endocrinology* **24**:697-701, 1939.
20. Graham, W. R., Jr. The effect of thyroidectomy and thyroid feeding on the milk secretion and milk fat production of cows. *J. Nutrition* **7**:407-429, 1934.
21. Brain, W. R., and Turnbull, H. M. Exophthalmic ophthalmoplegia, with pathological report on ocular muscles and thyroid glands. *Quart. J. Med.* **7**:293-323, 1938.
22. Means, J. H., Hertz, S., and Williams, R. H. Graves' disease with dissociation of thyrotoxicosis and oculopathy. *Tr. A. Am. Physicians* (in press).
23. Salter, W. T., Bassett, A. M., and Sappington, T. S. Protein-bound iodine in blood. VI. Its relation to thyroid function in one hundred clinical cases. *Am. J. M. Sc.* **202**:527-542, 1941.
24. Salter, W. T. *The Endocrine Function of Iodine.* 351 pp. Cambridge: Harvard University Press, 1940.
25. Perkin, H. J., Lahey, F. H., and Cattell, R. B. Blood iodine studies in relation to thyroid disease. Basic concept of the relation of iodine to the thyroid gland; an iodine tolerance test. *New Eng. J. Med.* **214**:45-52, 1936.
26. Meyer, A. E., and Yost, M. The stimulating action on metabolism and heart beat of various thyroid preparations, determined in the thyroidectomized rat. *Endocrinology* **24**:806-813, 1939.
27. Lerman, J., and Salter, W. T. Relief of myxedema with proteins of extrathyroidal origin. *Endocrinology* **25**:712-720, 1939.

PROBLEMS IN THE RECOGNITION AND TREATMENT OF TESTICULAR INSUFFICIENCY*

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MANY of the properties of the testicular hormone have long been understood by physicians from years of acquaintance with eunuchs and eunuchoids, and certain influences of the synthetic androgens were accordingly readily foreseen. Other influences of the therapeutic androgens have, however, occasioned some surprise and have prompted re-examination of testicular functions less well grasped in the past, functions that still require much work for their proper understanding. The influences of testosterone and its relatives on sexual drive and on general body metabolism are effects that may shed new light on the place of the testis in human economy.

The exact composition of the hormone or hormones secreted by the testis is unknown. Testosterone, isolated from bull testes in 1935 and largely obtained at present by the degradation of cholesterol, seems to repair castration defects very well, and to possess no exceptional or unnatural properties (Koch[1] and Moore[2]). Certain active esters of testosterone, the acetate and the propionate, are now used extensively in clinical and biological work, and owe their popularity to the fact that they are four times more powerful than testosterone itself in evoking growth of the prostate and seminal vesicles of the castrate rat when subcutaneous injections in oil are given.[3, 4] This advantage seems to lie in a slower and more favorable rate of absorption from subcutaneous oil pools in this species and does not mean that these esters approximate the natural hormone in composition. A similar and even more striking enhancement of effect is provided by implantation of testosterone in pellets under the skin.[5] It is difficult to say what difference it will make when the precise form of the natural androgenic secretion is

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known, but reservations derived from this ignorance should be kept in mind. Such reservations are applicable especially to the consideration of methyl-testosterone, which retains much of its activity on oral administration.[6] It is certain that this substance does not increase urinary androgen excretion when given orally to man nearly so much as testosterone does.[7, 8] The significance of this peculiarity is not clear, and most careful examination is desirable before the full equivalence of methyl-testosterone to the testis in a clinical sense is accepted.

When testosterone or one of its active relatives is given in proper dosage to a eunuch or a eunuchoid or to a child, one of the first and most consistent and distinct reactions induced is an increase in frequency, intensity and duration of erections of the penis.[9–11] This response may occur within a few hours of the initial dose, usually within a few days, and may be intense enough to reach priapism. It is often accompanied by erythema and edema about the genitalia and by considerable increase in sexual desire and capacity for intercourse. As the anatomic responses to the androgens progress, this heightened genital irritability often subsides somewhat but still remains fairly distinct. This effect recedes on cessation of treatment in the majority of cases, and is not consistently simulated by responses to placebos.

It is true that the sexual activity of several lower forms of animals had long been known to be strictly dependent on testicular hormones,[12] but experience with man had suggested an overwhelming importance of mental attitudes for sexual drive. Although castrate men often complained of waning potency, in others both inclination and capacity for intercourse were at least to some extent retained for years.[13, 14] It was accordingly tempting to interpret the irregular depression of sexual power after castration as psychogenic, occurring by virtue of the subject's unhappy expectations, rather than by virtue of his loss of hormones. The erotogenic property of the therapeutic androgens has, however, restored confidence in the validity of the eunuch's story of impaired sexual drive. Man in his evolutionary progress has not lost the primitive sensitiveness to erotogenic testicular secretions, but with the elaboration of cerebral function and the permeation of consciousness by sexual and quasi-sexual concerns, his nervous system has grown less dependent on hormonal excitation and more dependent on the countless factors shaping emotional life. From individual to individual, the resultants of humoral and nervous or psychic forces must vary greatly. The former factor still requires attention throughout the study of the pathology of the sexual impulse.

How useful is testosterone in enhancing the sexual drive in those many men, apparently sound physically, who nevertheless suffer from sluggish sexual desire and inability to perform normal coitus? It is conceivable that the desire and potency of certain men might be increased beyond that induced by their own normal androgens sufficiently to overcome fears and misgivings that had frustrated the original normal sexual drive. The answer as thus far known is not very hopeful. Rubinstein and Kurland,[15] Rennie, Vest and Howard,[16] and Kenyon et al.[17] have injected testosterone propionate into normal men, and in no case has the slightest effect on frequency of erections or sexual desire been recorded. Although hypernormal excretion of urinary androgens[18] and nitrogen retention[17] can be readily induced, the sexual drive is unaffected. This is clearly no final statement; individuals vary too much for that, but it seems unlikely that the sexual drive natural to any person with sound testes can often be readily increased.

Occult testicular insufficiency, however, may exist in some impotent men. After castration of the man who has once reached sexual maturity or after discontinuance of effective androgen therapy in the hypogonad, the deep voice remains, the penis may not recede to an unmistakably hypoplastic state, genital, trunk and facial hair falls out slowly and irregularly, and considerable amounts of inactive prostatic tissue may remain palpable. It is thus quite possible that a significant reduction in the amounts of testicular secretion for fairly long periods may go undetected if observation is confined to these sluggish and unquantitative physical criteria of androgen production. It would be easy indeed to invoke psychogenesis at such times. Unfortunately, assays for urinary derivatives of the testicular hormone have not been widely applied to impotent men. Zones of overlap apparent between those with normal testes and even those who are grossly hypogonadal will probably restrict the usefulness of such procedures, however, to some extent at least. One is thus left with the therapeutic trial, easy to apply and hard to interpret. Although benefit in the treatment of impotent men with testosterone propionate has been reported, the extensive experience of Rennie, Vest and Howard[16] indicates that such benefit is not often secured.

Carmichael, Noonan and Kenyon[19] treated, with testosterone propionate, 18 men who suffered variously from inadequate sexual desire, failure to secure or sustain erections at the time of coitus, and premature ejaculation. With the exception of one man who had atrophic testes but a normal penis, prostate and secondary sex characteristics,

none suffered from pertinent organic disease. Twenty-five milligrams, intramuscularly, three times weekly was given because this seemed adequate replacement dosage in patients with gross testicular defects. Relief of the impotence was obtained in 7 of the patients—2 children were begot by these men; 11 patients were unaffected. Unfortunately, the successes do not bear close inspection. In no case was cessation of treatment or substitution of inert sesame oil for the androgen accompanied by such relapse within a few weeks as would be expected if there was genuine dependence on the testosterone propionate. At first, the patient with atrophic testes seemed to distinguish between testosterone and sesame oil, but in the end he wearied of treatment and carried on successfully for at least a month after the last injection, so that dependence was quite doubtful. The only conservative interpretation of these results is that any benefit secured was psychologic—suggestion either pure and simple or suggestion arising from an initial physiologic excitation with successful coitus and restored confidence.*

It still remains to be seen whether testosterone propionate will cure any patient whose impotence is not amenable to rather simple inquiry, explanation and reassurance, or to treatment by placebo. My guess is that in time one will find such people—those with occult testicular insufficiency whose hormone production is below their particular nervous thresholds for adequate sexual drive. Perhaps they will be found among older men whose hormonal production is normally declining, but, in any event, they are probably a small minority of impotent men. In the search for these, however, I believe the therapeutic trial with androgens is desirable when simple psychologic methods fail. Twenty-five milligrams of testosterone propionate intramuscularly in sesame oil three time weekly, or methyl-testosterone, 50 to 100 mg., orally, daily for three weeks, should be adequate. Semen examinations at weekly intervals during such a procedure are wise. These dosages may in time reduce the number of spermatozoa and eventually cause their disappearance from the semen.[21, 22] Although such depression is always recovered from after androgens are stopped, so far as I know, there is no point in producing it. If such a therapeutic trial is successful, cessation of treatment or substitution of an inert substance may establish dependency on the androgen or lack of it. When treatment fails, recourse must be had to more elaborate psychotherapy.

The metabolic effects of the androgens have been of great interest to our group and, I believe, emphasize an aspect of testicular function that has received little attention. The data described here were gathered by Knowlton, Sandiford, Bryan, Koch, Lotwin and myself.[10, 17, 18, 23] Soon after the beginning of treatment of the eunuchoid with testosterone propionate intramuscularly, an increase in body weight is observed, amounting in our experience to 7 to 20 pounds at the maximum, and accompanied, on occasion, by slight edema of the face and ankles. The process is self-limited, a plateau appearing in forty to seventy days despite continued treatment. When the patient is examined on a constant food and fluid intake, a sharp decline in the urinary excretion of nitrogen and inorganic phosphorus, potassium, sodium and chloride is observed, while the urine volume declines and the body weight increases. During recovery from the testosterone effect, sodium and chloride, deposited largely in extracellular spaces, are quickly lost, together with associated water, while nitrogen, presumably stored as protein within cells, is still being retained. The inconspicuous losses of nitrogen for as long as thirty-eight days after cessation of therapy attest to the tenacity with which deposited protein is retained. The decline in urinary nitrogen is reflected completely in the urea fraction, and no increase in the concentration of nitrogenous constituents of the blood occurs. Fecal nitrogen is unaffected. When substantial creatinuria is induced by creatine feeding, this substance is also retained under the influence of the androgen.

The nitrogen retention has been previously described by Kochakian and Murlin[24, 25] in the castrate dog, and nitrogen and several electrolytes have been shown to be retained in the normal dog, as well as in an impotent man by Thorn and Engel.[26] In both rats[27] and monkeys,[28] creatine excretion is affected by androgens as in man. So far as work has progressed, therefore, the chemical reactions to androgens seem fairly general among animals. Exceptions in detail occur and will probably become more abundant in time as more species are studied.

The amounts of protein estimated as stored in the eunuchoid range from 109 to 395 gm. in ten to twenty-five days, far in excess of those conceivably going to the prostate and seminal vesicles. The curve of gain in body weight predicted from the protein stored, together with the associated water, falls short of the actual gain in weight and differs in its course from the actual weight

*A possible complexity in interpreting the consequences of withdrawal of androgens should be noted, although it is well not to make too much of it at present. It may take several months for all sexual capacity to be completely extinguished in rats and rabbits when they are castrated after puberty,[19] and an immature drill (baboon) excited to sexual interest by androgens retained this interest for eighteen months after cessation of treatment.[20] Residual behavior patterns established by androgens and persisting after treatment must be considered. These may be difficult to separate from the results of suggestion in man.

curve. Retention of salt and water in extracellular spaces during treatment and their discharge thereafter probably account for the discrepancies.

It is of importance that nitrogen retention and salt and water retention have been produced in a subject with a craniopharyngioma in whom the anterior lobe of the pituitary body was reduced to a mere shred at autopsy.[23] It is therefore unlikely that these effects are mediated through the pituitary body.

The basal metabolic rate is increased by moderate dosages of testosterone propionate.[10, 23] In the extreme form of this effect, heat production may rise to levels as high as +40 per cent when large doses of methyl-testosterone are used, as in the experiments of McCullagh and his co-workers.[29] The elevation is much less striking when amounts of testosterone propionate conceived as replacing the testes are given.[18]

The retention of sodium, chloride and water is analogous to that produced by the chemically related adrenocortical substances in men and dogs with intact adrenal glands, an analogy well supported by the observations of Thorn and Harrop,[30] and Thorn and Engel[26] on the salt-retaining properties of several sex hormones. The analogy is incomplete, however, because the urinary excretion of potassium is characteristically increased by adrenal substances rather than reduced, as with testosterone propionate. This partial imitation of one steroid by another is no new phenomenon. Many other interesting examples could be cited.

The retention of nitrogen, creatine, inorganic phosphorus and potassium suggests a somatotropic effect of testosterone propionate. Papanicolaou and Falk[31] observed that testosterone propionate produced hypertrophy of the temporal muscles of the castrate male guinea pig and of the castrate or normal female. There was also an increase in total muscle mass. It is likely that new protein is deposited in muscle of man and probably elsewhere as well. Attempts are now being made to record the strength and fatigability of the muscles of hypogonadal men after treatment with androgens, and the results are thus far encouraging.[32, 33]

Recent evidence of great value demonstrates that, in certain boys, administration of androgens induces distinct gains in height. Webster and Hoskins[34] found 8 hypogonadal boys to grow on the average of 1.36 cm. per hundred days before treatment with testosterone propionate, 3.6 cm. during treatment, and 1.56 cm. after treatment. Browne and Ross[35] and McCullagh[36] added data of this same type, and Albright and his associates[37] secured increases in height in dwarfs with convincing physiologic evidence of anterior pituitary defect. Dorff,[38] using an identical twin as a control, secured an excellent demonstration of increased somatic growth in a short, poorly developed boy with chorionic gonadotropins, which stimulated androgen production by the boy's own testes. It is of interest that early epiphyseal closure has not as yet been induced in such subjects. From experience with older eunuchoids, however, and from the notorious early closure of epiphyses in children with precocious puberty, I should expect that carelessly large and protracted treatment of the young boy with androgens would in time effect epiphyseal fusion.

The responsibility of the testicular hormone itself for the normal adolescent growth spurt thus becomes clear, and the reason for the association of precocious genital and somatic development in boys with testicular tumors is now, I think, apparent. It is best, however, that such powerful properties of the androgens as these should be utilized by the physician in the young only when it is established beyond doubt that the patient's own testes will not spontaneously assert themselves. Under such circumstances, attempts at stimulation with chorionic gonadotropins are, I believe, the first choice. Androgens may be used in event of failure.

Two important therapeutic applications of the somatotropic properties of the androgens have been made recently by the group at the Massachusetts General Hospital. Albright, Parson and Bloomberg[39] have proved that testosterone propionate will induce immediate nitrogen and phosphorus retention and eventually calcium retention in those with Cushing's syndrome, and they have observed that these anabolic influences were accompanied by an improved sense of well-being and physical efficiency. They conceive these effects as counteracting protein wastage inherent in the disease. Although further chemical support for the concept of protein loss as a critical metabolic event in Cushing's syndrome is admittedly necessary, guarded use of the androgens is desirable on the basis of this experience. The risks of further depressing testicular function in the male, and of protracting the amenorrhea and of advancing the masculinization of hair, voice and clitoris in the female must be carefully assessed, and dosages sought that will, if possible, avoid them. Profound debility seems to be the essential indication for therapy, and the defect likeliest to be remedied. There is no reason to believe that hypertension is affected by androgens.

The metabolic responses to androgens in those with hypopituitarism are in time accompanied by significant gains in physical efficiency, according

to Albright et al.[37] Thus, the role of the testis in the metabolic consequences of pituitary defect requires examination. Careful use of the androgens, with due consideration of their possible disadvantages, will define the value of this tool in pituitary failure.

Unpublished work of our own indicates that testosterone propionate exerts at least most of its characteristic metabolic influences in the aged man. How important this is from the functional standpoint is unsettled.

Thus, one begins to think of the nongenital properties of the androgens and to seek means of gauging their value in testicular insufficiency and in other pertinent disease. The work is young and the future unsettled, but the prospects of making something interesting and useful out of the somatotropic effects of these compounds are not too bad.

Summary and Conclusions

The testis is of importance in initiating and maintaining the sexual drive and the capacity for intercourse in the human male, although this role is shared by nervous factors.

Testosterone and its active relatives, which are known to enhance sexual excitability in the hypogonad, have not as yet been shown to affect men with sound testes.

Occult testicular insufficiency, however, may play a role in causing impotence in men without obvious testicular defect. At present, however, it seems likely that such testicular responsibility is rare.

Testosterone propionate relieves perhaps a third of impotent men, but discontinuance of treatment or substitution of placebos is not followed by prompt relapses, so that true dependence on androgens is difficult to establish. Conservative interpretation necessitates regarding the benefit as due to suggestion. In the search for cases of true occult testicular insufficiency, brief therapeutic trials with testosterone and its relatives, critically examined, are worth while.

Testosterone propionate induces retention of nitrogen, creatine, inorganic phosphorus, sodium, potassium and chloride and causes an increase in body weight and in the basal metabolic rate of underdeveloped men. Growth in height of undergrown, underdeveloped boys has been established. It is suggested that certain of these effects at least occur independent of the anterior pituitary body. The reasons for the association of sexual development with enhanced somatic growth during normal adolescence and in precocious puberty are hence clearer.

These somatotropic properties of the androgens may be of benefit in the treatment of certain aspects of pituitary insufficiency and Cushing's syndrome. There is need for further exploration of these possibilities.

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References

1. Koch, F. C. The biochemistry of the androgens. In Allen, Danforth and Doisy's *Sex and Internal Secretions*. Second edition. 1346 pp. Baltimore: Williams & Wilkins Co., 1939. Pp. 807-845.
2. Moore, C. R. The biology of the testis. Allen, Danforth and Doisy.[1] Pp. 353-451.
3. Miescher, K., Wettstein, A., and Tschopp, E. Activation of male sex hormones. *Biochem. J.* 30:1977-1990, 1936.
4. Moore, C. R., and Price, D. Some effects of testosterone and testosterone-propionate in the rat. *Anat. Rec.* 71:59-78, 1938.
5. Deanesly, R., and Parkes, A. S. Factors influencing effectiveness of administered hormones. *Proc. Roy. Soc., London*, Series B 124:279-298, 1937.
6. Miescher, K., and Tschopp, E. Über orals Wirksamkeit männlicher Sexualhormone: vorlaufige Mitteilung. *Schweiz. med. Wchnschr.* 68:1258, 1938.
7. Dorfman, R. I., and Hamilton, J. B. Concerning the metabolism of testosterone to androsterone. *J. Biol. Chem.* 133:753-760, 1940.
8. McCullagh, E. P. Peroral use of methyl-testosterone in testicular deficiency. *Cleveland Clin. Quart.* 7:226-230, 1940.
9. Hamilton, J. B. Treatment of sexual underdevelopment with synthetic male hormone substance. *Endocrinology* 21:649-654, 1937.
10. Kenyon, A. T. The effect of testosterone propionate on the genitalia, prostate, secondary sex characters and body weight in eunuchoidism. *Endocrinology* 23:121-134, 1938.
11. Vest, S. A., Jr., and Howard, J. E. Clinical experiments with the use of male sex hormones. *J. Urol.* 40:154-183, 1938.
12. Stone, C. P. Sex drive. Allen, Danforth and Doisy.[1] Pp. 1213-1262.
13. McCullagh, E. P., and Renshaw, J. F. The effects of castration in the adult male. *J. A. M. A.* 103:1140-1143, 1934.
14. Tauber, E. S. Effects of castration upon the sexuality of the adult male. *Psychosom. Med.* 2:74-87, 1940.
15. Rubinstein, H. S., and Kurland, A. A. The effect of testosterone propionate on spermatogenesis in the human. *South. M. J.* 32:499-503, 1939.
16. Rennie, T. A. C., Vest, S. A., Jr., and Howard, J. E. The use of testosterone propionate in impotence: clinical studies with male sex hormones. *South. M. J.* 32:1004-1007, 1939.
17. Kenyon, A. T., Knowlton, K., Sandiford, I., Koch, F. C., and Lotwin, G. A comparative study of the metabolic effects of testosterone propionate in normal men and women and in eunuchoidism. *Endocrinology* 26:26-45, 1940.
18. University of Chicago group: unpublished data.
19. Carmichael, H. T., Noonan, W. J., and Kenyon, A. T. The effects of testosterone propionate in impotence. *Am. J. Psychiat.* 97:919-941, 1941.
20. Zuckerman, S., and Parkes, A. S. Observations on secondary sexual characters in monkeys. *J. Endocrinol.* 1:430-439, 1939.
21. Heckel, N. J. Influence of testosterone propionate upon benign prostatic hypertrophy and spermatogenesis: a clinical and pathological study in the human. *J. Urol.* 43:286-308, 1940.
22. McCullagh, E. P., and McGurl, F. J. Effects of testosterone propionate on epiphyseal closure, sodium and chloride balance, and on sperm counts. *Endocrinology* 26:377-384, 1940.
23. Kenyon, A. T., Sandiford, I., Bryan, A. H., Knowlton, K., and Koch, F. C. The effect of testosterone propionate on nitrogen, electrolyte, water and energy metabolism in eunuchoidism. *Endocrinology* 23:135-153, 1938.
24. Kochakian, C. D., and Murlin, J. R. Effect of male hormone on protein and energy metabolism of castrate dogs. *J. Nutrition* 10:437-459, 1935.
25. Kochakian, C. D. Testosterone and testosterone acetate and the protein and energy metabolism of castrate dogs. *Endocrinology* 21:750-755, 1937.
26. Thorn, G. W., and Engel, L. L. The effect of sex hormones in the renal excretion of electrolytes. *J. Exper. Med.* 68:299-312, 1938.
27. Coffman, J. R., and Koch, F. C. The effect of testosterone propionate on induced creatinuria in rats. *J. Biol. Chem.* 135:519-530, 1940.
28. Jailer, J. W. Effect of castration and androgen therapy on creatine and creatinine excretion in monkeys. *Am. J. Physiol.* 130:503-511, 1940.
29. Jones, R., McCullagh, E. P., McCullagh, D. R., and Buckaloo, G. W. Methyl testosterone and increased basal metabolism. *Proceedings of the Association for the Study of Internal Secretions*, Atlantic City, May 2 and 3, 1941. P. 20.
30. Thorn, G. W., and Harrop, G. A. The "sodium retaining effect" of sex hormones. *Science* 86:40, 1937.
31. Papanicolaou, G. N., and Falk, E. A. General muscular hypertrophy induced by androgenic hormones. *Science* 87:238, 1938.
32. Hesser, F. H., Langworthy, O. R., and Vest, S. A. Muscle strength in myotonia atrophica improved by testosterone propionate. *Endocrinology* 26:241-243, 1940.
33. Simonson, E., Kearns, W. M., and Enzer, N. Effect of oral administration of methyl testosterone on fatigue in eunuchoids and castrates. *Endocrinology* 28:506-512, 1941.
34. Webster, R., and Hoskins, W. Influence of androgen therapy on growth rate of hypogonadal adolescent boys. *Proc. Soc. Exper. Biol. & Med.* 45:72-75, 1940.

35. Browne, J. S. L., and Ross, A. Influence of testosterone propionate on cases of retarded growth. *Proceedings of the Association for the Study of Internal Secretions.*[20] P. 16.
36. McCullagh, E. P.: personal communication.
37. Albright, F., Burnett, C. H., Parson, W., Reifenstein, E. C., and Smith, P. H. Effect of testosterone propionate on pan-hypopituitarism. *Proceedings of the Association for the Study of Internal Secretions.*[20] P. 19.
38. Dorff, G. B. Rapid growth in height produced by gonadotropin in a dwarfed infantile twin. *Proceedings of the Association for the Study of Internal Secretions.*[20] P. 18.
39. Albright, F., Parson, W., and Bloomberg, E. Cushing's syndrome interpreted as hyperadrenocorticism leading to hypergluconogenesis: results of treatment with testosterone propionate. *J. Clin. Endocrinol.* 1:375-384, 1941.

THE USE OF FEMALE SEX HORMONES IN DISORDERS OF WOMEN*

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FUNCTIONAL DISORDERS

THE application of the term "functional" to any disorder means that known pathologic causes have been ruled out, that the real cause is unknown, and that the disorder may not be permanent. This word reflects the still unsatisfactory state of knowledge concerning those disabilities in women that are attributed to hormone imbalance or lack, and indicates that any treatment must, for the present, be largely empirical. It also implies that all measures conducive to better general health, such as proper diet and elimination, emotional adjustment, regulation of habits, treatment of infected foci and anemia, and thyroid therapy, should be instituted, if necessary.

Amenorrhea

In patients with functional amenorrhea, whether primary or secondary, the really important aim is to produce ovulation. The available gonad-stimulating extracts of anterior hypophyses or of pregnant mares' serum have been tried with only rare success because, perhaps, they are not potent enough or, more probably, because they stimulate antihormonal bodies, containing as they do foreign protein, or because the primary disturbance is not gonad-stimulating insufficiency. Women with functional amenorrhea do not usually give the impression of having a pituitary disturbance. They either appear perfectly normal or are likelier to show stigmas that one associates with adrenal hyperactivity. Evidence is appearing that more and more interrelates the adrenocortical and ovarian hormones. Analysis of this relation may give a clue to the cause and cure of functional amenorrhea.

The induction of simple anovulatory uterine bleeding is sometimes desirable for psychiatric reasons and may be accomplished by trials with the preparations mentioned above or with placental hormone, chorionic gonadotropin or the steroid hormones, estrogen and progesterone.

Dysmenorrhea

Whether or not any endocrine imbalance exists in patients with essential or primary — that is, functional — dysmenorrhea remains to be demonstrated. What has been shown is that the symptoms may be mitigated or prevented by various hormones, provided they are given at such times during the cycle and in such amounts as to change the endocrine balance. The most dependable of these methods appears to be that of Sturgis and Albright,[1] who, by injecting estrogenic substance beginning on the sixth day after the start of menstruation, prevent ovulation and luteinization, thereby preventing the dysmenorrhea. This method is completely effective only during alternate months, but after a series of treatments, the intervening periods are likely to become less painful. At present, the cost to the physician of the estrogenic hormone for each painless catamenia induced is about $13.00. Because most physicians hesitate to upset a physiologic process, even to alleviate an exaggeration of the usual response to it, and because of the high cost of hormones, they tend to temporize by means of general health measures and simple antispasmodics and analgesics, especially with girls, until the passage of time or pregnancy brings amelioration. In spite of a trial of all nonoperative measures, an occasional case of functional dysmenorrhea must be submitted to presacral neurectomy, an essentially curative procedure without known consequent disability, if well executed, although it is radical and apparently unphysiologic.

Premenstrual Distress

Another functional disorder, so-called "premenstrual distress or tension," includes any or all the following symptoms: premenstrual headache, — often simulating migraine, — depression, irritability, epigastric distress, nausea, sense of abdominal swelling and sore breasts. These symptoms

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are common, especially in women between the age of thirty-five and the menopause. Because they are accompanied by premenstrual increases of weight and occasionally by local or generalized edema, they are thought to originate from sodium and water retention associated with changes in sex-hormone metabolism. A simple treatment introduced by Greenhill and Freed,[2] consisting in sodium chloride restriction and ammonium chloride ingestion during the last two weeks of the cycle, is reported to give gratifying relief. This method is presumably treating the result and not the cause of the disturbance. Satisfactory relief may also be obtained by the administration of sufficient estrogen or progesterone in the second half of the cycle, or by giving fairly large amounts of oral estrogen daily throughout the cycle. This is perhaps a more physiologic treatment, since these patients are thought to have beginning ovarian failure, and such therapy is likelier to relieve the breast symptoms.

Uterine Bleeding

Functional uterine bleeding is usually no therapeutic problem in women over forty years of age, since radiation castration is so simple and dependable, although it is neither ideal nor wholly desirable. Complete examination under anesthesia is a necessity in these patients, because it is the only way of making reasonably certain that cancer is not present. In younger women who are obviously not going to have a remission to normal cycles, either spontaneously or from general constitutional treatment with emphasis on the administration of thyroid and iron, it seems wiser to try curettage and then hormones before resorting to more radical surgery or temporary inhibition of the ovaries by radiation, especially since there can be no positive assurance that either of these procedures will be permanently curative in any patient, unless performed radically enough to involve the possibility of permanent damage. Chorionic gonadotropin, when injected during the flow in daily doses of 1000 to 2500 international units for four to eight days, may be expected to stop functional uterine bleeding at least temporarily in about 75 per cent of cases and to result in apparent cure in about 40 per cent. If it is to be effective, chorionic gonadotropin must be given in large doses, for smaller amounts may aggravate the bleeding. Unfortunately, large injections may be painful. Equine gonad-stimulating hormone has not yet been found to be of dependable value in this condition. Testosterone in large daily dosage, although it is costly, stops functional uterine bleeding, apparently through the desirable effect of temporary ovarian inhibition. Progesterone appears to be the ideal drug, at least for inhibiting bleeding in a physiologic manner, even if it may not remedy the basic cause, but thus far it has been too expensive for extensive clinical studies.

Habitual Abortion

Although habitual or threatened abortion or threatened miscarriage involves various and complex possible causes, the known necessity of adequate progesterone for normal gestation indicates its use in these precarious states. Circumstantial evidence implies that much more progesterone is secreted than appears as urinary pregnandiol. Hence, I believe it might be of more value than reports at present suggest if it is given in much larger doses. Furthermore, I believe it would be more clearly valuable if injected with estrogen.

In experimental work, estrogen is necessary for the optimum effect of progesterone and for stimulating and maintaining luteal activity. That it is also necessary for progesterone activity in human beings is indicated by the fact that its increases and decreases precede or accompany increases and decreases of progesterone both in menstrual cycles and in pregnancy, including those cases of threatened abortion in which changes in these hormones have been detected. Evidence of progesterone secretion is never found in the absence of estrogen. Conversely, secretion of estrogen without consequent or concomitant secretion of progesterone does occur and may result in typical functional uterine bleeding. In fact, all the available evidence shows that these two hormones are complementary, that they enhance and regulate each other's properties, and that they are physiologic companions. The idea that estrogen may cause abortion in human beings may be completely disregarded, since otherwise we should all certainly by now be acquainted with such use.

These considerations make me optimistic that better results will be achieved in all conditions in which estrogen or progesterone alone has already seemed of value just as soon as one becomes accustomed to the idea of administering these hormones in combination and their cost drops to a practical range.

Sterility

Functional sterility involves so many factors in each partner that no straightforward indication for the use of hormones has been determined. Poor semen and failure of ovulation continue to compel trials of gonad-stimulating factors, but general constitutional measures and postcoital insufflation during the time of possible ovulation should not be disregarded. The oral administration of estrogenic

substance in moderate amounts for months has often seemed worth while.

Other Disorders

Senile Vaginitis

Senile vaginitis severe enough to be symptomatically disturbing is a relatively rare condition, and usually responds to simple antiseptic measures and persistent cleanliness. The characteristic slight staining demands thorough investigation. To hasten cure both by its local effect in increasing acidity and stimulating activity of vaginal epithelium and by its general beneficial effect in the menopause, estrogen is helpful if given in large dosage. I think that a combination of estrogen and progesterone will in time be found even better.

Vulval Itching and Irritation

Itching and irritation of the vulva, especially with involvement of the perineum, the perianal region, the intergluteal fold and the upper inner thighs, suggest urinary sugar and the vaginal trichomonal or fungous infection as causes. Cleanliness and a fair trial of a mild sulfur and salicylic acid ointment are likely to give prompt relief if a fungus is the cause. If, however, the vulva alone itches and is whitened, thickened and crinkly, more deep-seated and irreversible pathologic changes are present. Although there is as yet no evidence to justify a fear that the use of hormones may cause cancer in human beings, in this site or elsewhere, prolonged inunctions with estrogen in tissues of known potential malignancy do not seem warranted and, being only palliative, delay the relief that attends the simple operation of complete superficial vulvectomy.

Cystic Disease of the Mammary Glands

The background of cystic disease of the mammary glands and its end stage is so uncertain that no place for any hormone in treatment is apparent.

* * *

The practical use of female sex hormones in disorders of women is indeed still limited. Clinical trials are vastly easier than fundamental investigation, but until more basic knowledge is acquired, voluminous contradictory and poorly controlled results will continue to appear and bewilder even those who are supposed to have more than average familiarity with the field. Many physicians believe that they are behind the times in the matter of hormone treatment and that others can accomplish more with hormones than they can. From my own experience, in practice and laboratory and from a fairly intimate acquaintance with the literature, I can assure them that they are not really behind the times, for just as soon as a treatment is found to be clearly and consistently effective, it rapidly comes into universally accepted use. Only estrogen, alone, in the treatment of the menopause has reached that goal.

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References

1. Sturgis, S. H., and Albright, F. The mechanism of estrin therapy in the relief of dysmenorrhea. *Endocrinology* 26:68-72, 1940.
2. Greenhill, J. P., and Freed, S. C. The mechanism and treatment of premenstrual distress with ammonium chloride. *Endocrinology* 26:529-531, 1940.

THE CURRENT STATUS OF FEMALE SEX HORMONES*

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A DECADE ago, endocrinologists were confident that within a few years the new knowledge that they had secured would come into productive use to solve many of the problems of gynecology. Toward the end of that decade, an eminent gynecologist, who had himself contributed a great deal to the newer developments, stated in effect that, except for a certain amount of amelioration of the discomforts of the menopause, gynecic endocrinology had contributed practically nothing to the welfare of women. The condemnation was no doubt too sweeping, but it serves to raise the question why the discoveries of the investigators have failed to yield more substantial clinical returns. It is the chief purpose of this paper to reconsider some of the fundamental evidence for the light that may be shed on this problem. A second purpose is to suggest certain possibilities for the extension of clinical research, with the idea of making the physiologic discoveries more fruitful.

PHYSIOLOGY

Among the many important discoveries regarding the sexual physiology of women, one of the most meaningful is that destruction of the anterior lobe of the pituitary gland leads to a profound depression of the reproductive structures and functions. The further discovery that the sex depression can be corrected by the use of pituitary grafts or extracts shows that it is due to the loss of one or more stimulating hormones. By chemical manipulation of the extracts, the stimulating material has been obtained in high concentration and shown to be of protein nature. It is known as gonadotropin. More recently, gonadotropin has been separated into two chemical fractions, pure or nearly pure, one of which stimulates the corpus luteum and one the follicular apparatus. These fractions are LH (luteinizing hormone) and FSH (follicle-stimulating hormone). The fundamental controlling influence of the anterior lobe of the pituitary gland on the ovaries is now firmly established. This key fact must be kept in mind in practical research on the sex functions.

But the ovaries — including the corpora lutea — also exercise a large measure of control over the pituitary gland. This arrangement leads to a complex set of interrelations that should also be taken into account in attempting to apply physiologic knowledge to problems of reproductive dysfunction.

The best known feature of ovarian physiology, as such, is the secretion of the estrogenic hormone. This is formed chiefly by the follicular apparatus. The secretion reaches full tide at the midmenstrual period when the follicle is ready to discharge an ovum. It is at this time that the phenomenon of heat occurs in animals and that concern with heterosexual matters is at its height in women. As the estrogen output has been increasing, it has been exercising a cumulative inhibitory effect on the anterior lobe of the pituitary gland, so that when estrogen is at flood tide, FSH is at ebb. The ovary is thus deprived of its pituitary support, and estrogen secretion, in its turn, largely ceases. Then, after a lag, the brakes are released, that is, the inhibition of the pituitary gland wears off, the secretion of FSH begins again, causing the secretion of more estrogen, and the total cycle is repeated. Thus, the ebb and flow of gonadotropin bring about an ebb and flow of estrogen, and vice versa.

The actual drive behind both sets of cyclic events is, of course, the secretion tendency of the individual cells, but the factor that makes for cyclicism is largely the lag in the influence of each of the hormones on its target organ. There is some evidence, however, that the cyclicism resides more in the pituitary gland than in the ovary — the evidence being chiefly that spayed monkeys, under the constant influence of estrogen supplied at a minimal effective rate, can sometimes be made to menstruate regularly.

But this relation of FSH to estrogen is only half the story. The trend of recent evidence is to show with increasing clarity that a similar relation exists between the luteinizing hormone and the corpus luteum. Although explicit quantitative data are yet lacking, the end results indicate that, while the FSH tide is receding, the LH tide is rising and thus ensuring the development of a new corpus luteum. This structure begins at once to secrete progestin. After a few days, the progestin level reaches a point at which the production of LH by the pituitary gland is halted, and progestin formation then wanes. Thus, a second reciprocal series of cyclic events is set up. These alternate in phase with the FSH and

*Presented at the annual meeting of the Massachusetts Medical Society, Boston, May 22, 1941.

†Research associate in physiology, Harvard Medical School; director of research, Worcester State Hospital and Memorial Foundation for Neuro-Endocrine Research.

estrogen cycles. The total result is like that of two seesaws operating side by side so that while the end of one is going up the corresponding end of the other is going down.

The consequence of this double reciprocating arrangement is that on every day of the month the four hormones concerned — LH, progestin, FSH and estrogen — are normally present in different absolute amounts, as well as in different proportions of one to another. It is only by this nice and constantly shifting system of checks and balances that the normal menstrual cycle is maintained. Any serious dislocation of the fourfold balance spells menstrual disorder.

Practical and Theoretical Applications

Although a certain amount of palliation of menstrual disorders can sometimes be achieved without taking these fundamental facts fully into account, actual restoration to normality, which is of course the real goal of the therapist, cannot be obtained.

First, there is an important consequence of the fact that the gonadotropins are protein substances: if given at all, they must be administered in such a way as to escape digestion. This fact places a considerable limitation on their practical use. Secondly, the gonadotropins, LH and FSH come into action alternately, and if Nature is to be imitated at all closely in the control of cyclic dysfunctions, they must therefore be given in sequence, with due consideration of the proportion of the cycle in which each is dominant. If both the gonadotropins are given together, they must necessarily be largely self-defeating remedies: what is gained by the promotion of estrogen secretion in phase is lost by the promotion of progestin secretion out of phase, and vice versa. But at the present time, only mixtures of the two pituitary gonadotropins are available. Thus, an impasse is reached, and at a stroke, half the theoretical possibilities of ovarian control are lost. The practical conclusion of the matter is that pituitary gonadotropins as at present available are probably not worth using.

However, according to current findings in Cohn's[1] laboratory, the pituitary FSH is an albumin whereas LH is a globulin; hence, they could perhaps be prepared separately in commercial practice without too great difficulty. However, another difficulty is inescapable: the yield is very small, and these two hormones are consequently too expensive for the use of anyone but investigators and millionaires.

Less expensive than the pituitary hormones are the various chorionic gonadotropins that are obtainable from human placentas and pregnancy urine. These, however, have the physiologic function of promoting the relatively steady state of pregnancy and not the cyclic events that are principally concerned in this discussion. Whether these products could be chemically manipulated to give fractions having purely follicle-stimulating and corpus-luteum-stimulating properties remains to be determined. The mare-serum gonadotropin was formerly believed to give pure follicle stimulation, but more recent work shows that it also influences corpus-luteum development. In recapitulation, then, the successful therapeutic control of cyclic ovarian functions in large measure still awaits the production of separate follicle-stimulating and corpus-luteum-stimulating hormones.

Even when such preparations become available, however, another practical difficulty will still remain. In the natural scheme of things, the gonadotropins flow into the blood stream, not at a constant rate, but with everchanging ebb and flow. Therefore, the therapeutic mimic, if he is to conform to Nature, must change the dosage every day in the month, and at some stages of the cycle he must give both hormones together.

A partial escape from the manifold difficulties of gonadotropin therapy lies in efforts to control the secretion of these substances by the patient herself. The therapist may elect to give the ovarian hormones, estrogen and progestin, instead of the gonadotropins, and may depend on their influence on the regulator gland to maintain the ebb and flow of the gonadotropins. The same considerations regarding sequence and shifting dosages apply, of course, to the ovarian hormones as to the gonadotropins.

Is this all so complex as to add up to therapeutic nonsense? It should be noted that the complexities are Nature's doing and not the endocrinologist's. The facts can only be faced. Unless physiologic conditions can be restored in the ailing woman, she must necessarily remain in a pathologic status. It is true that any one of the four hormones can be given arbitrarily in any dosage desired and, so given, may by good luck restore normality on some day of the cycle, but by the same token must necessarily induce abnormality during the other twenty-seven days. The best, therefore, that can be hoped for by any system of constant dosage is the substitution of one abnormal condition for another. It may or may not be better than the abnormality that it supersedes. As a matter of clinical fact, it is sometimes better, and the patient secures considerable relief. To determine just how much clinical results could be

improved by following a stair-step pattern of dosage levels of the sex hormones and using them in normal temporal sequence, more research is needed.

Not only the slopes of the sex-hormone production curves but also the quantitative levels at which the curves are set are important characteristics. Estrogen, for example, is both a stimulating and a depressing agent, the end effect depending largely on the amount that is used. In the lower dosage range, it stimulates the uterus and various other secondary reproductive structures. It also supports the corpus luteum and facilitates the metabolism of its hormone, progestin. There is some evidence that it may also stimulate the anterior pituitary gland and the ovary itself. But as the blood-estrogen level increases, the effect shifts predominantly to depression, and especially depression of FSH production. Through this depressive range, estrogen when given as a sex stimulant is largely a self-defeating remedy. By analogy, it is as though the motor of a car were supplied with more gasoline but with the brakes simultaneously tightened. The car under such conditions may actually be brought to a standstill. Finally, by increasing the dosage still further, the braking effect can largely be overcome and stimulation of most of the target organs secured. To return to the analogy, the car can be forced to go ahead even with the brakes set, but that procedure is not good for the car. Likewise, a woman with a vital part of her anterior pituitary gland paralyzed is certainly not in a good physiologic condition. The best that can be hoped for with unphysiologic dosages is some sort of passably good performance in a fundamentally maladjusted organism.

It is possible that further research will show that, in a substantial proportion of clinical cases, when stimulation is desired, more could be accomplished with estrogen by keeping the dosage within the primary stimulating range and giving it time gradually to exert its influence than by administering the abnormally large doses that are commonly employed when stimulation is desired.

In the use of the gonadotropins and primary sex hormones, various difficult problems of diagnosis are, of course, involved. In any type of replacement therapy, it is essential to know just what is to be replaced and just how extensive is the deficit that is to be corrected. However, an adequate consideration of these problems is impossible here. It may only be reiterated that menstrual disorders may be due to either pituitary or ovarian misbehavior. Better results would presumably be obtained with gonadotropins in the one event and with primary sex hormones in the other — provided, of course, that these are given in appropriate dosage and sequence.

So far as I know, there is only one clinical situation in which current therapeutic practice comports at all adequately with physiologic principles. That is in the treatment of the menopause. This is a time of transition in which the waning production of ovarian hormones takes the brakes off the anterior pituitary gland and allows the body to be flooded with gonadotropins. The exuberance can be checked in any one of several ways and, according to present evidence, with about equal success. X-ray treatments can be directed at the pituitary gland, or primary sex hormones in depressing dosages can be given. Estrogens or androgens are about equally effective, except that if the dosage of androgen is too high the woman may grow a mustache or show other evidence of masculinization. There seems to be, however, a fairly wide margin of safety.

Another striking fact, which the practical therapeutist conventionally ignores, is that women produce nearly as much male sex hormone as men. The estrogens and androgens apparently circulate in fairly definite proportions, one to the other. Just what Nature is about in setting up this curiously paradoxical state of affairs remains, so far as I know, a complete mystery. But it seems to be necessarily a fact that whenever estrogen is administered in significant dosage the normal estrogen-androgen ratio is disturbed. It is possible that the arrangement is meaningful and that the therapeutist may have to reckon with that meaning before his results become entirely satisfying either to himself or to his patients. As an empirical procedure, it might be worth while to study the comparative effects of estrogen given by itself and also given with balancing doses of androgen — both being kept within physiologic limits of quantity.

Another theoretical, if not practical, complication in gynecic endocrinology is that the adrenal cortex is able to produce sex hormones, both estrogens and androgens. This potentiality is most easily recognized when cortical neoplasm or hyperplasia results in the masculinizing of women or the feminizing of men. Sex hormones are often found in unusual amount or type in the urine of such patients. What part the adrenal glands may play in cyclical sex activities of normal women is, so far as I am informed, completely unknown. It is possible that a significant relation exists, and it may be one of practical moment; this is, of course, a proper subject for research.

An additional hormone that has considerable

influence on the reproductive processes is prolactin. It, too, is an anterior pituitary derivative. Although prolactin has been discussed mostly in relation to mammary-gland activity, it has an essential relation with the sex glands proper. As Riddle[2] showed early in the course of his studies, this hormone has a rather marked depressing effect on both the ovaries and the testes. In rodents, at least, it also has a remarkable effect on the instinctual drives, arousing strongly the maternal impulses. By its use, a virgin rat can be made to adopt and mother not only baby rats but also mice, rabbits or even squabs. Nature apparently makes some little use of prolactin as an agent for depressing the ovaries of women, thus producing amenorrhea during the early weeks of nursing. Whether aberrations of prolactin secretion play any significant role in the ordinary menstrual disorders is, I believe, quite unknown. Further research might reveal practical aspects of that possibility. What therapeutic use prolactin might have further in the prevention of pregnancy or in the assuagement of overardent amatory proclivities in women also seems to be an appropriate matter for clinical investigation.

The purpose of this discussion has been chiefly to suggest some of the possibilities of research that might improve the yield of practical clinical results. The fundamental physiology is complex: the application of that physiology in clinical practice will probably have to be equally complex to give the best results. Particularly, stair-step dosage and proper timing of alternating materials will perhaps prove to be absolutely necessary conditions to success in many cases. Except for the treatment of menopausal disturbances, there appears to be little hope in the traditional patterns of drug therapy. There is not now and probably never will be any effective easy way to practice gynecology by using endocrine therapy.

Summary and Conclusions

Some of the older and the newer physiologic evidence is re-examined in relation to potential clinical applicability. The normal cyclic sex behavior of women is the result of several complexly interacting controlling factors. Serious derangement of any one factor can lead to clinical dysfunction. The goal of the therapeutist is to restore normality by substituting physiologic for pathologic ovarian behavior. To accomplish this, the factor or factors at fault must be recognized and appropriately dealt with.

The fault may lie in the anterior pituitary gland. Any one or more of three hormones may be involved — two gonadotropic factors (FSH and LH) and prolactin. These are protein bodies and must therefore be administered parenterally. They are expensive. The first two should be administered in proper alternating sequences. At present, only mixtures are available; hence gonadotropic therapy is theoretically self-defeating. Pregnant-mare preparations give purer but not entirely specific effects. Prolactin serves under normal conditions as a gonad depressant; research may show it to have some clinical value aside from its stimulating effect on the mammary glands.

More practicable for substitution therapy are the sex hormones proper, the estrogens and progestin or their synthetic substitutes. These, too, must be given alternately and in phase, if their natural production is to be imitated. Each depresses the production of its corresponding gonadotropin.

All four of the gonadotropic and primary sex hormones are secreted at daily varying rates so that the blood titers, as well as the proportions existing naturally among them, differ on each day of the month. Restoration of normality therefore necessitates stair-step dosages, in addition to sequential administration.

The estrogens have a three-phase influence, depending on dosage. In the smallest effective range, pure stimulation seems to result. In the intermediate range, the anterior lobe of the pituitary gland and the gonads are depressed, so that the total effect may be depression. In the highest ranges, the depressions may be overcompensated. This is the conventional but pathologic range that is commonly employed. Such overdosage is theoretically indicated only in treatment of the menopause.

The adrenal cortex is capable of forming several sex hormones. More research is needed to determine whether they play a role in the normal sex activities of women and thus enter into the therapeutic equation.

Women secrete both male and female sex hormones in somewhat constant proportions. Research is needed to determine whether the male hormone plays a physiologic role and what its therapeutic value in conditions other than the menopause may be.

It is emphasized that the normal physiologic mechanisms are in part not yet known and that Nature's use of the sex hormones, even as now known, is but poorly imitated by the practical therapeutist.

25 Shattuck Street

References

1. Fevold, H. L., Lee, M., Hisaw, F. L., and Cohn, E. J. Studies in the physical chemistry of the anterior pituitary hormones. *Endocrinology* 26:999-1004, 1940.
2. Lahr, E. L., and Riddle, O. Temporary suppression of estrous cycles in the rat by prolactin. *Proc. Soc. Exper. Biol. & Med.* 34:880-883. 1936.

MASSACHUSETTS MEDICAL SOCIETY

PROCEEDINGS OF THE COUNCIL

Stated Meeting, October 1, 1941

A STATED meeting of the Council of the Massachusetts Medical Society was called to order at 10:30 a. m. in John Ware Hall, Boston Medical Library, 8 Fenway, Boston, by the president, Dr. Frank R. Ober, Suffolk; 201 councilors were present (Appendix No. 1).

The record of the annual meeting, May 21-22, 1941, as published in the *New England Journal of Medicine*, issue of June 26, 1941, was presented by the Secretary, who moved its acceptance. This motion was seconded by Dr. Charles J. Kickham, Norfolk, and it was so ordered by vote of the Council.

Reports of Standing Committees

Executive

Preliminary to presenting the report of the Executive Committee, the Secretary spoke of three errors which appear in the 1941 edition of the by-laws of the Massachusetts Medical Society.

> The word "Council," which begins line 8 on page 14, should be "Society."
>
> The word "Society," which begins line 10 on page 14, should be "Council."
>
> The words "a President-Elect and" in line 14 on page 14 should be deleted.

He asked that he be informed of the discovery of other errors. He announced that a flier, which will point out such errors and their corrections, will be prepared and made available to every member of the Society. It will be requested that this flier shall be pasted on the inside cover of the 1941 edition of the by-laws.

The Secretary presented the report of the Executive Committee (Appendix No. 2). He reported that this committee was organized on June 23, 1941, with Dr. Frank R. Ober, president of the Massachusetts Medical Society, presiding. Dr. Edward P. Bagg, vice-president of the Society, was elected vice-chairman of the committee. Dr. Michael A. Tighe served as secretary. Lots were drawn to determine those members of the committee who would serve one, two and three years. The result was as follows:

THREE YEARS

Berkshire: John J. Boland, Pittsfield.
Franklin: Frederick J. Barnard, Greenfield.
Hampden: George L. Steele, Springfield.
Middlesex North: William M. Collins, Lowell.
Norfolk: Carl Bearse, Boston.
Worcester North: John J. Curley, Leominster.

TWO YEARS

Barnstable: William D. Kinney, Osterville.
Bristol North: William H. Allen, Mansfield.
Bristol South: Edwin D. Gardner, New Bedford.
Essex North: Frank W. Snow, Newburyport.
Middlesex East: Kenneth L. Maclachlan, Melrose.
Plymouth: Peirce H. Leavitt, Brockton.

ONE YEAR

Essex South: Loring Grimes, Swampscott.
Hampshire: Lucius B. Pond, Easthampton.
Middlesex South: Dwight O'Hara, Waltham.
Norfolk South: Daniel B. Reardon, Quincy.
Suffolk: Augustus Thorndike, Jr., Boston.
Worcester: Ralph S. Perkins, Worcester.

Mr. Robert St. B. Boyd was elected executive secretary.

The second meeting was held September 10, 1941. Out of this meeting came several recommendations.

> *Recommendation 1.* The Executive Committee recommends that the Council of the Massachusetts Medical Society designate the first day of the annual meeting as the time of the annual meeting of the Society.
>
> *Recommendation 2.* The Executive Committee recommends that the Council of the Massachusetts Medical Society hold its annual meeting on the evening previous to the annual meeting of the Society.

These recommendations were considered together. The Secretary moved their adoption. Dr. William D. Kinney, Barnstable, seconded the motion, and it was so ordered by vote of the Council.

> *Recommendation 3.* The Executive Committee recommends that the Council of the Massachusetts Medical Society authorize the appointment, by the President, of a committee of five, which committee shall be known as the Rehabilitation Committee.

The Secretary moved its adoption. The motion was seconded by Dr. Brainard F. Conley, Middlesex South, and it was so ordered by vote of the Council.

> *Recommendation 4.* The Executive Committee recommends to the Council of the Massachusetts Medical Society that the Committee on State and National Legislation be instructed to study further the matter which has to do with the number of years a foreign practitioner of medicine should be resident in Massachusetts before being allowed to take the examinations of the Massachusetts Board of Registration in Medicine.

The Secretary moved its adoption. The motion was seconded by Dr. Daniel J. Ellison, Middlesex North, and it was so ordered by vote of the Council.

The Secretary spoke of the by-laws intended to govern the proposed Massachusetts Medical Service Corporation and said that the Executive Committee commended these by-laws to the earnest consideration of the Council.

The Secretary read the following resolution:

WHEREAS, The Massachusetts Medical Society is desirous that all skillful and ethical practitioners of medicine in Massachusetts shall be members of the Massachusetts Medical Society;

WHEREAS, Chapter V, Section 2, of the by-laws of the Massachusetts Medical Society provides the means by which practitioners of medicine in Massachusetts may become members of the Massachusetts Medical Society;

WHEREAS, By the language involved in Chapter V, Section 2, of the by-laws of the Massachusetts Medical Society the Council of the Massachusetts Medical Society intends that it shall have accurate knowledge of the training, medical skill and ethical conduct of those who seek admission to membership in the Massachusetts Medical Society;

WHEREAS, In the case of graduates of nonapproved schools, Chapter V, Section 2, of the by-laws of the Massachusetts Medical Society provides that the applicant for membership in the Massachusetts Medical Society shall have been in the practice of medicine for a minimum of five years;

WHEREAS, In establishing such a period of probation for graduates of nonapproved schools, the Council of the Massachusetts Medical Society intends that it shall have had opportunity to observe closely the medical skill and ethical conduct of such applicants; and

WHEREAS, In the case of most graduates of foreign medical schools who have been in the practice of medicine for five years in foreign countries, the Council of the Massachusetts Medical Society has no opportunity to know of the training or adequately observe the medical skill and ethical conduct of such medical practitioners; therefore, be it

RESOLVED, That the Council of the Massachusetts Medical Society interprets the phrase "who has practiced for a minimum of five years," as appearing in the by-laws of the Massachusetts Medical Society, Chapter V, Section 2 (*b*), to mean what is meant by the phrase, who has lawfully practiced for a minimum of five years in the United States; and be it further

RESOLVED, That the Council of the Massachusetts Medical Society shall be considered to have accurate knowledge of the medical training and medical skill of such graduates of foreign medical schools who have practiced medicine in foreign countries for five years and who are eminent in the profession of medicine and well known to the Council of the Massachusetts Medical Society for their scientific attainments, provided such practitioners shall have satisfied the Council of the Massachusetts Medical Society that their medical practice has been ethical according to the standards as set down in the *Code of Ethics* of the American Medical Association.

He moved its adoption. This motion was seconded by Dr. Conley.

Dr. John P. Monks, Suffolk, chairman of the Committee on Medical Education opposed the adoption of the resolution. In doing so, he announced that his committee agreed wholeheartedly with those paragraphs in the resolution which seek to interpret what was in the mind of the Council when it set down the circumstances under which physicians are to be admitted to membership in the Massachusetts Medical Society. His committee could not agree with and did oppose that part of the resolve which sought to interpret the words "who has practiced for a minimum of five years," appearing in Chapter V, Section 2 (*b*), of the by-laws, to mean what is meant by the phrase "who has lawfully practiced for a minimum of five years in the United States." He said that his committee interprets the language in question as meaning five years since graduation from medical school. He said that it was also the feeling of his committee that foreign practitioners who had practiced for five years in a foreign country, should be resident in this country for a minimum of one year and that for distinguished members of the profession who might be found in this group the minimum requirement might be shortened to six months. He added that the requirement of five-year residence in this country had been discussed at the April meeting of the Council and defeated. He also said that this resolution had first been brought to the attention of his committee by being published in the *Journal*.

There was a great deal of discussion of this resolution by the councilors, and many questions were directed to Dr. Monks. Those participating were Dr. John J. Boland, Berkshire; Dr. Conley; Dr. Charles C. Lund, Suffolk; Dr. Isaac R. Jankelson, Norfolk; Dr. Kenneth L. Maclachlan, Middlesex East; Dr. Reginald Fitz, Suffolk; Dr. Donald Munro, Suffolk, and Dr. Carl Bearse, Norfolk.

Dr. Elmer S. Bagnall, Essex North, made the following motion, which was seconded by Dr. Fitz:

> I move that this matter be laid on the table so that there may be opportunity for further consideration by both committees.

On vote of the Council, it was so ordered.

The Secretary moved the adoption of the report of the Executive Committee as a whole, that part which dealt with the resolution being excepted. The motion was seconded, and it was so ordered by vote of the Council.

Membership

The report (Appendix No. 3), which was presented by Dr. G. Colket Caner, Middlesex South, recommended that three fellows be allowed to retire, three be allowed to resign, two be allowed to have their dues remitted, five be allowed to change their membership from one district society to another without change of legal residence and six be recommended for readmission.

It was moved by Dr. Maclachlan and seconded by Dr. John B. Hall, Norfolk, that the report be accepted and the recommendations adopted. It was so ordered by vote of the Council.

Financial Planning and Budget

Dr. John Homans, Suffolk, reported by letter that this committee had nothing to report. On motion of the Secretary, seconded by Dr. Albert A. Hornor, Suffolk, the report was accepted by vote of the Council.

Publications

Dr. Richard M. Smith, Suffolk, reported that his committee had nothing to report. A motion to accept the report was made by Dr. Hornor, seconded by Dr. Fitz, and it was so ordered by vote of the Council.

Arrangements

This report (Appendix No. 4) was offered by Dr. William T. O'Halloran, Suffolk. The committee recommended that the annual meeting of the Massachusetts Medical Society be held at the Hotel Statler in Boston, May 26 and 27, 1942. This recommendation was adopted by vote of the Council on motion of Dr. O'Halloran and the second of Dr. Hornor.

Dr. O'Halloran suggested that, in determining the dates of the annual meeting, care must be exercised so as not to conflict with the time of the meeting of the American Medical Association. He also suggested that invitations to hold the annual meeting of the Massachusetts Medical Society outside Boston should be forwarded to the Committee of Arrangements well before the preceding annual meeting of the Council. He said that his committee also endorsed the proposal of the Executive Committee that the annual meeting of the Council be held on the evening preceding the annual meeting of the Society. Dr. O'Halloran moved the acceptance of the report as a whole. This motion was seconded by Dr. Hall, and it was so ordered by vote of the Council.

Ethics and Discipline

Dr. Ralph R. Stratton, Middlesex East, reported progress. It was moved and seconded that this report be accepted, and it was so ordered by vote of the Council.

Medical Education

Dr. John P. Monks, Suffolk, reported progress. On motion of Dr. Hornor and a second by Dr. Conley, the report was accepted by vote of the Council.

State and National Legislation

While reading this report (Appendix No. 5), Dr. Henry C. Marble, Suffolk, departed from the text for a moment to speak of the premarital examination law which, among other things, requires the prospective bride and groom to undergo a serologic test. He spoke of the necessity of unity on the part of physicians in approaching the Legislature. Dr. Marble moved the acceptance of the report and Dr. David Cheever, Suffolk, seconded the motion.

Dr. Conley objected to the report's being accepted as a report of the committee. He said, "I desire to state to the Council that Dr. Conley and Dr. Lionberger dissent from that report." Dr. Conley explained that, while he had received this report before the Council meeting, it had come to him too late to allow him to give it mature consideration.

Dr. Charles J. Kickham asked Dr. Marble why it was that the committee's report was not signed by each member of the committee. Dr. Marble answered that the report was written by the chairman and submitted to all members of the committee. He said that a majority of the committee approved it. Dr. Conley at this point said that the report was received by him September 29, 1941, at 10:45 p.m.

Dr. Maclachlan stated that this was the first time he had known that the Council or the Committee on State and National Legislation had changed its ideas on the premarital bill. He asked Dr. Marble to explain the changes made in the bill, to go over prior bills and to state why they approved of the bill whereas formerly they were opposed to it as drawn.

Dr. Marble explained that when this bill was first presented with other premarital bills, the committee discussed it at length and could not discover that any of the surrounding states had passed premarital bills. He explained that later this bill was rewritten and that the obligation to report was taken out. He said that a couple of years ago the Council had approved a previous bill of this kind, which was more extreme than the present one. He said that under this bill only the interested parties need be notified of the results of the examination.

On vote by the Council the report of the Committee on State and National Legislation was accepted, notice being taken that Drs. Conley and Lionberger dissented.

Public Health

There was no response from the chairman, Dr. Francis P. Denny, Norfolk.

Medical Defense

There was no response from the chairman, Dr. Arthur W. Allen, Suffolk.

Permanent Home

Dr. Charles S. Butler, Suffolk, reported that Dr. William H. Robey, Suffolk, had been called away and that the committee had nothing to report. It was moved and seconded that the report be accepted, and it was so ordered by vote of the Council.

REPORTS OF SPECIAL COMMITTEES

Cancer

Dr. Shields Warren, Suffolk, reported that his committee had nothing to report. On motion of Dr. Stratton and a second by Dr. Lund, the report was accepted by vote of the Council.

Public Relations

The report of the committee (Appendix No. 6) was offered by Dr. Bagnall. He reported that the committee was stimulating progress toward the setting up of district committees for improvement in the distribution of medical care in the field of tax-supported medical care.

The special committee of five on prepayment medical-care costs insurance — Dr. James C. McCann, Worcester, chairman — reported through the Committee on Public Relations on a tentative set of by-laws (published in the September 18 issue of the *Journal*) to govern a corporation to be known as the "Massachusetts Medical Service Corporation." This phase of the committee's report was presented by Dr. McCann (Appendix No. 6).

Dr. Shields Warren, Suffolk, member of the special committee of five, spoke of having had opportunity to discuss these by-laws with the authorities of the Michigan plan, and added that it was their opinion that these by-laws had most of the advantages of theirs and avoided some of the headaches.

The Council recessed at 1:00 p. m. for the Cotting Luncheon, and reconvened at 1:35 p. m.

Dr. McCann moved that the by-laws presented be accepted in principle. This motion was seconded by Dr. Charles E. Mongan, Middlesex South. Dr. Mongan qualified his second by saying that it should be understood that the committee had authority to clarify the English and change any part which might not meet with the approval of the Massachusetts Insurance Commissioner. Dr. McCann accepted the qualifications, and on vote of the Council, the motion was adopted.

Dr. Bagnall moved the acceptance of the report as a whole; this was seconded by Dr. Warren, and it was so ordered by vote of the Council.

Postgraduate Instruction

Dr. Fitz reported (Appendix No. 7) that governmental funds had been curtailed and that the expense of the general courses will be met by a registration fee of five dollars, which will be paid by each physician taking the course. He also spoke of the Fourth New England Postgraduate Assembly, to be held at Harvard University, October 29 and 30, 1941.

Dr. Fitz moved the adoption of the report. The motion was seconded, and it was so ordered by vote of the Council.

Physical Therapy

A councilor reported that Dr. Franklin P. Lowry, Middlesex South, chairman of the committee, wished him to report that his committee had nothing to report. It was moved and seconded that this report be accepted, and it was so ordered by vote of the Council.

Expert Testimony

Dr. George L. Schadt, Hampden, reported that his committee had nothing to report. It was moved and seconded that this report be accepted, and it was so ordered by vote of the Council.

Automobile Insurance

There was no response from the chairman, Dr. Marble.

Convalescent Care

In the absence of Dr. T. Duckett Jones, chairman, the Secretary read an abstract of the report (Appendix No. 8) and moved that the report be accepted. This motion was seconded by Dr. Mongan, who spoke of the importance of the work which this committee was doing and of some of its complexities. The motion was adopted by vote of the Council.

Industrial Health

There was no response from the chairman, Dr. W. Irving Clark, Worcester.

Army Medical Library and Museum

The Secretary, who read the report (Appendix No. 9) in the absence of the chairman, Dr. Henry R. Viets, moved its acceptance. The motion was

seconded by Dr. Fitz, and it was so ordered by vote of the Council.

Study of the Practice of Medicine by Unregistered Persons

The chairman, Dr. Richard Dutton, Middlesex East, reported that the committee had nothing to report. It was moved by Dr. Lund and seconded by Dr. Fitz that this report be accepted, and it was so ordered by vote of the Council.

Committee to Meet With Massachusetts Hospital Association

There was no response from the chairman, Dr. Howard M. Clute, Suffolk.

Medical Preparedness

Dr. Fitz reported that his committee had nothing to report. It was moved and seconded that the report be accepted, and it was so ordered by vote of the Council.

Committee to Examine WPA Records

Dr. Guy L. Richardson, Essex North, before offering his formal report (Appendix No. 10), spoke of a physician who complained to his Senator that he was not getting enough WPA work. Dr. Richardson said that this situation was bad, and added that the physician in question had been advised to send in the full matter of his complaint, whereupon the matter was dropped.

Dr. Richardson spoke of hernias which developed in WPA workers and said that, except in emergency, it was the ruling of the WPA authority that, if these hernias were to be operated on, the operation would have to be performed in the Marine Hospital.

Dr. Richardson moved the acceptance of the report. Dr. Conley seconded the motion.

Dr. William E. Browne, Suffolk, said that the WPA officials were generally very fair. He said, however, that this particular ruling might be very hard on the person who developed a hernia in North Adams and had to go to Brighton to have it repaired. Dr. Bearse was also critical of this ruling. Dr. Richardson said that his committee had protested the ruling, which had come from the Commission in Washington, because of the unfavorable experience which it had in these cases when the ruling was otherwise. Dr. Peirce H. Leavitt, Plymouth, said that it was an unfair ruling and that he hoped the committee would continue to try to have it changed.

There was further discussion by Drs. Bagnall, Richardson and Browne. The question was demanded from several sources in the Council. Dr. Ober put the motion, and it was passed.

Maternal Welfare

There was no response from the chairman, Dr. Judson A. Smith.

Study of Practice of Medicine

Dr. Dwight O'Hara, Middlesex South, read the report (Appendix No. 11) and moved its adoption. This was seconded by Dr. Hornor.

Dr. Mongan asked what was the present status of the law in regard to the standards of medical education in Massachusetts. Dr. O'Hara said that it was his understanding that the matter was in the hands of the Approving Authority, which is empowered to act in 1945.

Dr. Mongan said he did not understand it that way. He spoke of the several extensions of the date when this law would become operative which had been granted by the Legislature. He said that this last extension ended in 1940.

The Secretary relayed a conversation which he had had with the secretary of the State Board of Registration in Medicine, in which the latter said that the schools had until 1945 to live up to whatever regulations the Approving Authority made. He further said that the secretary of the State Board of Registration in Medicine had promised to send to him certain information about the activities of the Approving Authority and that that communication was awaited.

Dr. Mongan spoke of the theory under which these extensions were granted and said in substance that the first extension was granted so as not to penalize any student who had in good faith entered a school whose standards might possibly be questioned. He moved, "That the President and Secretary take upon themselves to inquire from the Attorney General's office what, in the opinion of the Attorney General, is the interpretation of the law."

Dr. Ober announced that there was a motion before the house and that if Dr. Mongan's thought prevailed it would have to be offered as an amendment to the original motion. The Secretary said that it was his belief that the Attorney General would not give an opinion on a matter of law to a private organization such as the Society. These opinions are usually reserved for departments which are in the government. Dr. Mongan thought this might be so.

Dr. Norman A. Welch, Norfolk, said, and he asked Dr. O'Hara to correct him if he was wrong, that it was his understanding of the law that it is now effective for the scrutinizing of the education of students who entered these schools in September, 1941, and that these schools are to be under this scrutiny during the next four years, to deter-

mine the education which they give the entering classes that go in this year. Dr. O'Hara said that this was his understanding.

The motion to accept the report was put by Dr. Ober and was passed.

Dr. Mongan moved that the matter in question be given the attention of the President and Secretary with a view of enlightening the Council concerning what the situation is. This motion was seconded by Dr. Fitz and adopted on vote of the Council.

Appointments

Dr. Ober said that in making the following appointments he had had the assistance of the Executive Committee. He added that by this means he hoped to make better appointments than otherwise would be possible.

Dr. LeRoy A. Schall, Middlesex South — chairman, Auditing Committee

Dr. John Rock, Norfolk — member, Auditing Committee

Dr. Reginald Fitz, Suffolk — chairman, Committee on Postgraduate Instruction

Dr. James C. McCann, Worcester — chairman, Special Committee Concerned with Prepaid Medical-Care Costs Insurance

Dr. Elmer S. Bagnall, Essex North, and Dr. Peirce H. Leavitt, Plymouth — members, Special Committee Concerned with Prepaid Medical-Care Costs Insurance.

Dr. Daniel L. Lynch, Norfolk — member, Committee on Industrial Health

Dr. Walter G. Phippen, Essex South — consultant to the Joint Committee on Health Education of the State of Massachusetts

Representatives from the Massachusetts Medical Society to the Massachusetts Central Health Council:

Dr. Robert J. Carpenter, Berkshire
Dr. Francis P. Denny, Norfolk
Dr. George D. Henderson, Hampden
Dr. William D. Kinney, Barnstable
Dr. Erwin C. Miller, Worcester
Dr. Robert B. Osgood, Suffolk

Dr. Eugene W. Beauchamp and Dr. Stanley C. Cox — councilors, Hampden

Dr. John M. Murphy—councilor, Hampshire

Dr. William J. Brickley and Dr. Maurice Fremont-Smith — councilors, Suffolk

Dr. Frederic Hagler — supervising censor, Hampden

Dr. James B. Bigelow — censor, Hampden

Dr. Henry A. Robinson and Dr. Daniel J. Bailey — censors, Norfolk South

It was moved, seconded and passed that the Secretary be instructed to cast one ballot confirming these appointments. The Secretary announced that this direction had been complied with.

Other Business

Dr. Ober then announced that the meeting was now open for any business that might legally come before it.

The treasurer, Dr. Butler, asked the Council for a special appropriation of $125.00 to cover the expenses of the Executive Committee. He offered this as a motion. It was seconded by Dr. Mongan and adopted by vote of the Council.

There was much discussion about certain additions to the Committee on Public Relations. Dr. Bagnall moved that the vice-president, president-elect and secretary be added to the committee, that the president-elect be authorized to serve as vice-chairman of the committee and that all three additional members be without authority to vote. This motion was seconded and adopted on vote of the Council.

Dr. J. Harper Blaisdell, Middlesex East, moved that the President appoint a committee of five, which shall consider necessary and desirable changes in the by-laws and which shall report its recommendations in writing at the next meeting of the Council. Dr. Blaisdell said that the by-laws need many changes. He pointed to the section which provides for the election of a president-elect and stated that, as this reads, the president-elect serves for one day only. He gave Dr. Dutton credit for the initiative in this matter. Dr. Fitz seconded Dr. Blaisdell's motion, and it was so ordered by vote of the Council.

Dr. Maclachlan discussed House Bill 460, and under the authority of the Middlesex East District Medical Society (September 17, 1941) offered the following motion:

> That the Committee on State and National Legislation be instructed to take any and all such action possible to modify, amend and/or clarify the provisions of the Premarital Examination Law (House Bill 460).

It was seconded by a councilor. Dr. Maclachlan said that there were a great many members of the Society who do not like this law. He added that apparently it had been approved by the Committee on State and National Legislation, although he was sure that the Society did not know of its approval. He then proceeded to read from the law. The motion was passed.

There being no further business before the Council, adjournment was ordered at 3:15 p. m.

Michael A. Tighe, *Secretary*

APPENDIX NO. 1

Attendance

Barnstable
W. D. Kinney

Berkshire
J. J. Boland
I. S. F. Dodd
C. F. Kernan

Bristol North
W. H. Allen
J. H. Brewster
R. M. Chambers
J. L. Murphy
W. H. Swift

Bristol South
G. W. Blood
E. D. Gardner
H. E. Perry
C. C. Tripp

Essex North
E. S. Bagnall
R. V. Baketel
L. R. Chaput
E. H. Ganley
H. R. Kurth
P. J. Look
R. C. Norris
G. L. Richardson
A. F. Shea
F. W. Snow
T. N. Stone

Essex South
Bernard Appel
C. P. Brown
C. L. Curtis
S. E. Golden
Loring Grimes
J. F. Jordan
B. B. Mansfield
W. G. Phippen
E. D. Reynolds
C. F. Twomey
C. A. Worthen

Franklin
F. J. Barnard
A. H. Ellis
W. J. Pelletier
H. G. Stetson

Hampden
W. C. Barnes
W. A. R. Chapin
E. C. Dubois
P. E. Gear
Frederic Hagler
G. D. Henderson
E. A. Knowlton
M. W. Pearson
G. L. Schadt

Middlesex East
J. H. Blaisdell
Richard Dutton
K. L. Maclachlan
R. W. Sheehy
R. R. Stratton

Middlesex North
H. R. Coburn
W. M. Collins
D. J. Ellison
A. R. Gardner
W. H. Sherman
M. A. Tighe

Middlesex South
C. F. Atwood
E. W. Barron
W. B. Bartlett
S. M. Biddle
G. F. H. Bowers
R. N. Brown
R. W. Buck
E. J. Butler
B. F. Conley
C. H. Dalton
H. F. Day
C. L. Derick
J. E. Dodd
J. G. Downing
C. W. Finnerty
F. W. Gay
H. G. Giddings
H. W. Godfrey
A. M. Jackson
E. E. Kattwinkel
A. A. Levi
F. P. Lowry
A. N. Makechnie
R. A. McCarty
J. C. Merriam
Dudley Merrill
C. E. Mongan
J. P. Nelligan
Dwight O'Hara
L. S. Pilcher
E. H. Robbins
E. F. Ryan
J. W. Sever
E. F. Sewall
R. A. Taylor
H. W. Thayer
J. H. Townsend
J. E. Vance
Hovhannes Zovickian

Norfolk
J. R. Barry
Carl Bearse
M. I. Berman
H. M. Emmons
J. E. Fish
David Glunts
B. T. Guild
D. L. Halbersleben
J. B. Hall
R. J. Heffernan
H. J. Inglis
I. R. Jankelson
C. J. Kickham
E. L. Kickham
D. L. Lionberger
D. S. Luce
C. M. Lydon
T. F. P. Lyons
Charles Malone
F. P. McCarthy
M. W. O'Connell
H. C. Petterson
S. M. Saltz
D. D. Scannell
J. W. Spellman
M. H. Spellman
J. P. Treanor, Jr.
W. J. Walton
N. A. Welch

Norfolk South
C. S. Adams
H. H. A. Blyth
R. L. Cook
D. B. Reardon
H. A. Robinson
W. L. Sargent

Plymouth
P. B. Kelly
P. H. Leavitt
G. A. Moore
D. W. Pope
W. H. Pulsifer

Suffolk
H. L. Albright
W. B. Breed
W. E. Browne
C. S. Butler
G. C. Caner
David Cheever
M. H. Clifford
Pasquale Costanza
R. L. DeNormandie
Reginald Fitz
Channing Frothingham
M. N. Fulton
A. A. Hornor
H. A. Kelly
T. H. Lanman
R. I. Lee
C. C. Lund
H. C. Marble
G. R. Minot
J. P. Monks
Donald Munro
R. N. Nye
F. R. Ober
J. P. O'Hare
L. E. Parkins
L. E. Phaneuf
Helen S. Pittman
W. H. Robey
G. C. Shattuck
R. M. Smith
Augustus Thorndike, Jr.
E. F. Timmins
S. N. Vose
Shields Warren
Conrad Wesselhoeft
C. F. Wilinsky

Worcester
J. C. Austin
Gordon Berry
W. P. Bowers
L. R. Bragg
P. H. Cook
G. A. Dix
E. B. Emerson
J. M. Fallon
E. L. Hunt
E. R. Leib
W. F. Lynch
A. W. Marsh
J. C. McCann
J. M. Melick
J. W. O'Connor
R. S. Perkins
W. C. Seelye
C. A. Sparrow
G. C. Tully
R. J. Ward
F. H. Washburn
R. P. Watkins
S. B. Woodward

Worcester North
H. C. Arey
E. A. Adams
C. B. Gay
J. C. Hales

APPENDIX NO. 2

Report of the Executive Committee

The Executive Committee has had two meetings. The organization meeting, held on June 23, 1941, was presided over by the president of the Massachusetts Medical Society, Dr. Frank R. Ober. Dr. Edward P. Bagg, vice-president of the Massachusetts Medical Society, was elected vice-chairman of the committee. Dr. Michael A. Tighe served as secretary. Under the by-laws it was necessary that at the moment of organization, this committee should select by lot six men who would serve for three years, six who would serve for two years and six who would serve for one year. The selection so made is as follows:

THREE YEARS

Berkshire: John J. Boland, Pittsfield.
Franklin: Frederick J. Barnard, Greenfield.
Hampden: George L. Steele, Springfield.
Middlesex North: William M. Collins, Lowell.
Norfolk: Carl Bearse, Boston.
Worcester North: John J. Curley, Leominster.

TWO YEARS

Barnstable: William D. Kinney, Osterville.
Bristol North: William H. Allen, Mansfield.
Bristol South: Edwin D. Gardner, New Bedford.
Essex North: Frank W. Snow, Newburyport.
Middlesex East: Kenneth L. Maclachlan, Melrose.
Plymouth: Peirce H. Leavitt, Brockton.

ONE YEAR

Essex South: Loring Grimes, Swampscott.
Hampshire: Lucius B. Pond, Easthampton.
Middlesex South: Dwight O'Hara, Waltham.
Norfolk South: Daniel B. Reardon, Quincy.
Suffolk: Augustus Thorndike, Jr., Boston.
Worcester: Ralph S. Perkins, Worcester.

It was voted by the Executive Committee to create the office of executive secretary. On nomination by the President, Mr. Robert St. B. Boyd was elected to this office.

The second meeting of the Executive Committee was held on September 10, 1941. Out of that meeting have come certain recommendations which are herein presented to the Council of the Massachusetts Medical Society.

Heretofore the annual meeting of the Council has been held on the morning of the first day of the annual meeting. Occasionally the Council meeting has run well into the afternoon. This arrangement has deprived the members of the Council of the privilege of attending many of the scientific sessions of the annual meeting.

The Executive Committee, while taking notice of the self-sacrificing interest which the members of the Council bring to the purely business affairs of the Society, still recognizes the direction in which their chief interest lies. This committee, having in mind the importance of the annual meeting of the Council and believing that attendance at this meeting should penalize the members of the Council as little as possible, offers the following recommendations:

Recommendation 1. The Executive Committee recommends that the Council of the Massachusetts Medical Society designate the first day of the annual meeting as the time of the annual meeting of the Society.

Recommendation 2. The Executive Committee recommends that the Council of the Massachusetts Medical Society hold its annual meeting on the evening previous to the annual meeting of the Society.

The committee believes that adoption of these recommendations does not involve a breach of the by-laws. Under the by-laws, the Council has the right to name the time and place of the annual meeting of the Society. The only provision in the by-laws which has to do with the annual meeting of the Council is to the effect that this meeting shall be held on the day previous to the annual meeting of the Society.

It has come to the attention of the Executive Committee that serious thought is being given to the matter of the rehabilitation of those selectees who have been rejected because of remedial defects. The Executive Committee, through its secretary, has been approached in this matter by Mr. Curtis M. Hilliard, director of the Committee on Health of the Massachusetts Committee on Public Safety. While this is not entirely a medical problem, it is to some extent. It would seem important that the Massachusetts Medical Society should participate, first, in the determination of the size of the problem and, secondly, in how best it can be solved.

Recommendation 3. The Executive Committee recommends that the Council of the Massachusetts Medical Society authorize the appointment, by the President, of a committee of five, which committee shall be known as the Rehabilitation Committee.

There has been much discussion in the Executive Committee as to the number of years a foreign practitioner of medicine should be resident in Massachusetts before being permitted to take the examinations of the Massachusetts Board of Registration in Medicine. The Executive Committee is entirely familiar with the present regulation which requires that such practitioners shall be the possessors of first citizenship papers. While this committee knows that the Committee on State and National Legislation has already given thought to this matter, it nevertheless believes that this is a subject for further exploration.

Recommendation 4. The Executive Committee recommends to the Council of the Massachusetts Medical Society that the Committee on State and National Legislation be instructed to study further the matter which has to do with the number of years a foreign practitioner of medicine should be resident in Massachusetts before being allowed to take the examinations of the Massachusetts Board of Registration in Medicine.

The Executive Committee has considered in detail and at great length a tentative set of by-laws under which it is proposed to set up a system of medical-care costs insurance. These by-laws were presented to the Executive Committee by Dr. James C. McCann, chairman of the special committee of five. A copy of these by-laws accompanied the notice calling this meeting. They will later be presented to the Council through the report of the Committee on Public Relations. The Executive Committee commends these by-laws to a painstaking and earnest consideration.

It has also come to the attention of the Executive Committee that there is much confusion in the minds of many fellows of the Massachusetts Medical Society as to the proper interpretation of certain phraseology contained in Chapter V, Section 2, of the by-laws of the Massachusetts Medical Society.

The Executive Committee therefore submits the following resolution by means of which it seeks to have the Council interpret the language involved:

WHEREAS, The Massachusetts Medical Society is desirous that all skillful and ethical practitioners of medicine in Massachusetts shall be members of the Massachusetts Medical Society;

WHEREAS, Chapter V, Section 2, of the by-laws of the Massachusetts Medical Society provides the means by which practitioners in medicine in Massachusetts may become members of the Massachusetts Medical Society;

WHEREAS, By the language involved in Chapter V, Section 2, of the by-laws of the Massachusetts Medical Society the Council of the Massachusetts Medical Society intends that it shall have accurate knowledge of the training, medical skill and ethical conduct of those

who seek admission to membership in the Massachusetts Medical Society:

WHEREAS, In the case of graduates of nonapproved schools, Chapter V, Section 2, of the by-laws of the Massachusetts Medical Society provides that the applicant for membership in the Massachusetts Medical Society shall have been in the practice of medicine for a minimum of five years;

WHEREAS, In establishing such a period of probation for graduates of nonapproved schools, the Council of the Massachusetts Medical Society intends that it shall have had opportunity to observe closely the medical skill and ethical conduct of such applicants; and

WHEREAS, In the case of most graduates of foreign medical schools who have been in the practice of medicine for five years in foreign countries, the Council of the Massachusetts Medical Society has no opportunity to know of the training or adequately observe the medical skill and ethical conduct of such medical practitioners; therefore, be it

RESOLVED, That the Council of the Massachusetts Medical Society interprets the phrase "who has practiced for a minimum of five years," as appearing in the by-laws of the Massachusetts Medical Society, Chapter V, Section 2 (*b*), to mean what is meant by the phrase, who has lawfully practiced for a minimum of five years in the United States; and be it further

RESOLVED, That the Council of the Massachusetts Medical Society shall be considered to have accurate knowledge of the medical training and medical skill of such graduates of foreign medical schools who have practiced medicine in foreign countries for five years and who are eminent in the profession of medicine and well known to the Council of the Massachusetts Medical Society for their scientific attainments, provided such practitioners shall have satisfied the Council of the Massachusetts Medical Society that their medical practice has been ethical according to the standards as set down in the *Code of Ethics* of the American Medical Association.

MICHAEL A. TIGHE, *Secretary*

APPENDIX NO. 3

REPORT OF THE COMMITTEE ON MEMBERSHIP

The committee recommends:

1. That the following named three fellows be allowed to retire under the provisions of Chapter I, Section 5, of the by-laws:

Collins, William J., Northampton
Eldridge, David G., Milton
Mason, Nathaniel R., Marblehead

2. That the following named three fellows be allowed to resign under the provisions of Chapter I, Section 7, of the by-laws:

Catinella, Paul J., Rochester, Minnesota
Macomber, Donald, Boston
Strong, Archibald M., New York City

3. That the dues of the following named two fellows be remitted under the provisions of Chapter I, Section 6, of the by-laws:

Ford, John F., Roslindale, 1941
Shukle, R. M., Boston, 1938 and 1939

4. That the following named five fellows be allowed to change their membership from one district society to another without change of legal residence, under the provisions of Chapter III, Section 3, of the by-laws:

FROM ESSEX SOUTH TO MIDDLESEX EAST

Ward, Joseph O., Saugus

FROM MIDDLESEX SOUTH TO SUFFOLK

Brailey, Allen G., Newton Highlands

FROM NORFOLK TO SUFFOLK

Anglem, Thomas J., Milton

FROM NORFOLK SOUTH TO SUFFOLK

Williams, Robert H., Squantum

FROM SUFFOLK TO MIDDLESEX EAST

Chisholm, Julian F., Jr., Boston

5. That the following named six fellows be recommended for readmission under the provisions of Chapter I, Section 10, of the by-laws:

Chayet, Jacob, Brookline
Dushan, Sidney S., Mattapan
Messer, Edward C., Dorchester
Peterson, Reuben, Duxbury
Pulsifer, Nathan, Lowell
Sannella, Theodore, Boston

G. COLKET CANER, *Chairman*

APPENDIX NO. 4

REPORT OF THE COMMITTEE OF ARRANGEMENTS

At a meeting, as required by Chapter VII of the by-laws of the Society, the Committee of Arrangements, in co-operation with Dr. Ober, voted, after due deliberation, to hold the next annual meeting of the Society in Boston at the Hotel Statler on May 26 and 27, 1942. If this convention according to custom were to be held on the second Wednesday of June (June 10), there would be a conflict with the annual meeting of the American Medical Association in Atlantic City; this did occur in 1931. Pending your authorization, therefore, it was decided that there should be no such conflict.

The Committee of Arrangements endorses firmly the proposal of the Executive Committee, which you have approved this morning, that the next annual meeting of the Council be held in the evening preceding the first day of the annual meeting of the Society, according to present plans on the evening of May 25, 1942. Such a change would not only permit councilors' attendance at program functions which they cannot enjoy as it is, but also it would allow them to advance likewise the date of the annual business meeting of the Society by one day to the first day of the convention. Then the program of the second day could proceed without interruption.

Reservations have been made tentatively at the Hotel Statler, whose greater accommodations are sufficient for all our usual or anticipated demands and where a better attendance is more likely. Concerning other important details, like progress with the composition of the speakers' program, no satisfactory report can be presented at this time since such arrangements are so contingent on your decisions of today.

For future meetings it might be a time-saving measure for the Council to declare that it expects no conflict in

the dates of the two conventions and that any invitations from district societies to hold the annual convention outside Boston must be received by the Committee of Arrangements well before the annual meeting of the Council. Please consider these suggestions as a part of this report of the Committee of Arrangements but not as motions for action.

This report ends with the resolution:

That the next annual meeting of the Massachusetts Medical Society be held at the Hotel Statler in Boston on May 26 and 27, 1942.

WILLIAM T. O'HALLORAN, *Chairman*

APPENDIX NO. 5

REPORT OF THE COMMITTEE ON STATE AND NATIONAL LEGISLATION

Organization. This committee was appointed at the annual meeting in 1940. There was a central organization of the following members: Henry C. Marble; David L. Lionberger; Brainard F. Conley; Charles A. Robinson; and Earle M. Chapman.

In each of the several districts a similar committee was appointed at their annual meetings, and during the past year of service, the following physicians have acted as chairmen of these committees: Dr. D. E. Higgins; Dr. P. J. Sullivan; Dr. W. M. Stobbs; Dr. E. F. Cody; Dr. Edward Ganley; Dr. C. A. Worthen; Dr. H. G. Stetson; Dr. W. A. R. Chapin; Dr. E. E. Thomas; Dr. K. L. Maclachlan; Dr. Michael A. Tighe; Dr. B. F. Conley; Dr. E. L. Kickham; Dr. J. E. Knowlton; Dr. George A. Moore; Dr. E. M. Chapman; Dr. L. M. Felton; Dr. J. V. Gallagher; and Dr. R. F. Bachmann.

Because of the geographical position of the central committee, it fell on this committee to attend most of the hearings at the State House, but at various times it was necessary to call in members of the other committees for assistance, and they all worked well in conjunction with us in carrying the legislative work of the Society into every corner of the State. It was because of this far-flung organization and effective work that we were able to accomplish what we did.

The Society engages the services of a legislative reporting bureau which reports to us all bills that have been entered and, in many cases, furnishes us with typewritten copies of the bills even before they are printed. It so happened during the early part of 1941 that on certain occasions a bill went to hearing before a legislative committee even before that bill had been officially printed. From this it must be clear that it was difficult to keep up with the flow of hearings. As each bill was entered, it was assigned to one of the members of the central committee for study. He read it, and thereafter reported with his recommendations at a meeting of the central committee; at that time the policy that should be followed was worked out. Immediately after this was done, the first legislative bulletin was published, which was sent to all the district legislative committees. Thereafter it was found that many bills had been entered that did not appear to be of interest to the Society because of the obscure title, and on several occasions it was not until a day or two before the bill was heard that we had knowledge of its existence, or were aware of the fact that it had medical implications. All this required hasty preparation and many telephone calls and hurried conferences.

After filing, each bill is assigned to a committee by the speaker of the House. The committee posts a date for the hearing. There may be many other hearings on the same date before the same committee. It is the duty of the committee and the legislative counsel of the committee to be present at all these hearings and to furnish proper evidence in the form of speakers to present the case of the Society.

After the hearing, the petition is written into the form of a bill and is presented to either the House of Representatives or the Senate. If, however, the bill calls for the expenditure of public funds, it must further be heard before the Committee on Ways and Means before going to the floor of the House or Senate. Any of these committees may amend, alter, change or entirely rewrite the bill. After the bill has been acted on in one branch, it is then referred to the other, where substantially this same program is repeated, and even in the case of a relatively unimportant petition, it must be carefully and diligently followed from beginning to end. To accomplish all this is a full-time job for at least one man, and a large part-time job for a legislative counsel.

If you will refer to the legislative bulletin, you will note that the various bills fall into several classes:

Medical education. This includes medical schools, medical training, requirements for practice, and control of matters of medical education. Into this class fall: S. 485; S. 560; H. 114; H. 272; H. 611; and H. 1222. We might say that it has been the policy of the committee to do everything in our power to improve and to safeguard the laws governing the practice of medicine. The bill establishing the Approving Authority to regulate medical schools has been in force since January, 1941. Up to this date, we have been unable to obtain a report.

Nurses and nursing education. The history of the effort by the Nurses Association to have a separate Board of Registration is long. However, the nurses' registration bill has been entirely rewritten from the form in which it was presented at first and has been passed through the Legislature and is now in force. In brief, there is a separate board of registration for nurses. There is, in addition, an advisory council with power to control matters of nurses' education and to approve hospitals having training schools. This further is expanded to include attendants. It is our feeling that this will be a satisfactory and useful bill.

Hospitals. A bill was presented by the Massachusetts Hospital Association, which bill we were glad to approve; it gave the Department of Public Health authority to license general hospitals. This bill started as H. 1232 and was rewritten as H. 2528. In the closing days of the legislative session this bill was passed and signed by the Governor.

Public health. The major item was the enactment of the Massachusetts Medical Society bill for the prepayment of medical care. This bill passed the Legislature, as nearly as I can determine, without a dissenting vote and is now a law.

Other bills were presented relative to premarital medical advice. H. 460, providing for premarital examination by a qualified physician, was passed and signed by the Governor on August 2. The annual anti-vaccination bill was presented and again given leave to withdraw. In general the committee sought to co-operate with the Department of Public Health in all constructive measures.

Drugs and poisons. Several bills were presented by the Department of Public Health relative to food and drugs. In all of these we supported the department.

An effort was made to restrict the sale of barbituric acid and its derivatives; this was not passed. A bill to limit the sale of pure ethyl alcohol was presented, but was defeated.

It is my considered opinion that the work of this committee in the future can be much simplified if many of these matters which we now have before us are considered and made part of a long-term policy of the Society. We should proceed to lay out a program of progressive public-health legislation that will embody most of the matters that have been here covered. It is further my opinion that this should be given to the Society long enough ahead so that it may have an opportunity to give the program careful study. I am entirely confident that any such long-range program would be welcomed by the Legislature. If the Medical Society offers such a progressive program, I am sure that it will forestall the filing of many time-consuming petitions.

HENRY C. MARBLE, *Chairman*

APPENDIX NO. 6

REPORT OF THE COMMITTEE ON PUBLIC RELATIONS

The Committee on Tax-Supported Medical Care, reporting through the Committee on Public Relations, is stimulating progress toward the setting up of district committees for improvement in the distribution of medical care in this field. The secretary of each district society and the delegates to the Committee on Public Relations are endeavoring to have the district committee authorized by the first meeting of the district society, thus carrying out the vote of the last Council meeting. Several local plans have been started on the initiative of organized medicine, and information regarding these is being distributed as fast as it becomes available.

The McCann Committee presents through the Committee on Public Relations the by-laws for a corporation to be known as the "Massachusetts Medical Service Corporation." These have been considered by the Committee on Public Relations, and it recommends their adoption as a basis for discussion, with the understanding that after constructive criticisms here and from other sources, they will be again presented to you for final approval before adoption. Rules, regulations and contracts with physicians and subscribers have not yet been prepared.

E. S. BAGNALL, *Secretary*

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REPORT OF THE COMMITTEE ON PREPAID MEDICAL-COSTS INSURANCE

For your consideration, the committee is presenting by-laws, which represent the most vital step in establishing a corporation for prepaid medical service. Within a set of by-laws are established the essential characteristics of a corporation; furthermore, by-laws can guarantee or forfeit very valuable rights and powers with reference to the practice of medicine.

With our presentation today there has been distributed a printed form of the by-laws. Although it does not constitute a printed final, an unalterable form for you to act on, these by-laws indicate in principle the type of corporation that your committee believes conforms with the intent of the majority of the Council and the Massachusetts Medical Society.

As you know, several years ago the Council decided by a majority vote to embark on a program of prepaid medical insurance. Under the able chairmanship of Dr. Thomas H. Lanman, this purpose was forwarded when an enabling act was signed by the Governor on May 22, 1941. The purposes behind your decision should necessarily be considered in a discussion of the character of any program on which we embark. Before going over the details of the by-laws, I wish, therefore, to give you the basic thoughts and the philosophy in the mind of your committee when it drew up the by-laws.

The purpose in establishing such a corporation is twofold. The first has reference to the public at large, particularly the low-income segment of the middle-class group. Owing to insecurity of work and the lack of fixity of income in our present industrial age, the members of the low-income group claim that medical costs often attain proportions that are difficult to meet. In attempting to meet this demand for relief, we think that there are two objectives to guide us. First, if we seek to help them ameliorate the cost of medical care it can be done on the widely established principle of insurance, which dilutes cost on the basis of distribution of risk over a large group; secondly, by budgeting and prepayment, we can make it possible to take care of unforeseen medical costs ahead of time. It is the opinion of your committee that you have not committed us to seek other ends, which would only act to complicate the program and jeopardize any chance for success. The second purpose is personal, but may be expressed in terms of enlightened self-interest: we openly seek to diminish the hazard of compulsory health insurance. The chances are that, if our program succeeds and is widely accepted by subscribers, we can ward off this threat. However, there are two important considerations. First, the proponents of compulsory insurance may urge that we have not and cannot enroll sufficient subscribers except by appeal to the principle of compulsion — they even threaten to apply this philosophy in the form of compulsory savings. The second point which may be a factor in failing to ward off compulsory insurance is the result of a demand for contributions from the employer and from the State in payment of the premiums. On this basis there may be a demand for participation by the State in the activities of the corporation. However, if we can enlarge adequately the subscription lists and the funds coming from subscribers, I think we shall find little difficulty in warding off compulsory insurance.

There is also another very important principle to keep in mind with reference to compulsory insurance, namely, that any legislative program which is to be established is usually based to a large extent on pre-existing conditions. Hence, if a compulsory-insurance program were worked out in the Legislature it would in all probability be based on our existing prepaid insurance corporation. In England, for example, the system is handled by the insurance carriers that were already underwriting the voluntary schemes. If by your initiative we establish a satisfactory program, or a relatively satisfactory one, we can assure to ourselves control over the purely medical aspects of the program. We shall have conserved to the physicians of the State certain rights and privileges inherent in medical practice, which we maintain belong to us. If a program of compulsion is unhappily imposed on us later, on the basis of established corporate practice, we can still probably save to ourselves these rights and privileges, and a satisfactory basis for practice.

Having reviewed this background, I now suggest that there are definite steps to be taken in succession to establish such a corporation on a sound basis. The first step, of course, is to procure an enabling act, which we

already have done. The second is the adoption of by-laws that will establish the character of the corporation, and this we now seek; the third is the preparation of rules and regulations, which must be based on established by-laws; the fourth is a study of the actuarial background in Massachusetts, in which task we shall profit greatly by the experience of other states which have already embarked on similar programs; and the last step is the preparation and offering of specific contracts.

To proceed with the writing of rules and regulations, your committee must know the type of corporation that physicians will accept, so that subsequent steps may be referred to a basic pattern. That is why it is urgent for us to arrive at a decision on this matter of the by-laws, which will create the pattern. There are three fundamental concepts that must always be kept in mind when writing the by-laws of such a potentially powerful corporation, so that we may not do damage to our own legitimate self-interest. These concepts are as follows: first, we are embarking very definitely on a business venture of great magnitude; secondly, we do so on the basis of establishing a corporate structure; and thirdly, so far as medical practice is concerned, it is to be done on a contract basis. So we are embarking on extremely troublesome waters, which involve us widely in the corporate and contract practice of medicine.

With reference to the business aspect of this program we should look at it from the vantage point of its parallel to the business structures that surround us. Thus we may clearly visualize our rights as well as our obligations, and guard against missteps which would lose us certain privileges and rights that are identified with the practice of medicine.

Any business structure is looked at from the viewpoints, first, of promotion, secondly, of organization and management and, thirdly, of finance. Certainly this program is one that is sponsored and promoted by the physicians. With reference to its organization and management, there is one basic principle that we must always keep in mind lest we be misled: namely, that the professional aspect of such a corporation transcends its administrative and monetary aspects. When an ordinary business corporation is established, the basic problems are administrative. In seeking the basic problems in our corporation, let us draw a parallel with workmen's compensation insurance, in which the professional or medical aspects require 85 per cent of the time to run the program. If we compare a medical-service organization, which is devoid of all the legal matters pertaining to liability, the value of services, cash benefits and so forth, with compensation insurance, which has all these features, certainly the medical or professional aspects of the former will loom even larger than those of the latter.

Then, too, I think we must insist that the contribution of the physician transcends the contribution represented by the premiums of the subscribers, which are only a lien or claim for completion of the contract. The subscriber contribution is not so-called "risk capital," any more than your premiums to a stock life-insurance company represent risk capital or an ownership claim. We are contributing the body of knowledge possessed by the whole medical profession, and the acquisition and use of that knowledge and skill by the individual physician. This knowledge, skill and practice represent, we should insist, capital knowledge that is of major importance in the operation of any medical-service corporation. Certainly our knowledge is patentable — consider insulin and viosterol; however, our ideals do not permit universal patenting, and our progress is a universal gift to mankind. If the patents of a business corporation represent some of its most valued assets, certainly the knowledge and technical skill of the physician should represent a major capital interest in this corporation. So that as your committee tried to preform the character of this corporation, it seemed equitable to us that, on the basis of business practices, the right of physicians to control judiciously this corporation should not be questioned.

With reference to the establishment of a corporate structure, we must give serious attention to the constitution of corporate structures and to the medicoeconomic significance of practicing medicine under a contract with a legal entity known as a corporation.

The corporation that we envision may be potentially a most powerful organization. If it should bring in a large proportion of the seven thousand resident physicians of Massachusetts, if it should bring in somewhere around 50 per cent of the 4,000,000 of the residents of the State, and if it should bring in all the funds that are turned over at present in the distribution of medical services between these groups, it could be one of the most powerful corporate structures in Massachusetts.

The one most important thing to keep in mind is the question wherein will control of the corporation reside? By what means will the physicians maintain their proper control of this corporate structure? Let us turn to the common business corporation to sense just what we are doing, keeping ever before us the truism of corporate practice, namely, that wherein resides control of the board of directors, there resides control of the corporation.

Corporations are of two basic types, the profit corporation and the nonprofit corporation. Under the profit corporation there are three types, so far as control of the board of directors is concerned. There is control by majority stock ownership, in which a sufficiently large block of stock is in the hands of one man or of a small limited group of men, so that he or they can dominate the board and the practices of the corporation. This power is achieved through the right to nominate and elect and to remove the board of directors. The directors are representatives of the stockholders who determine the practices of the corporation for the benefit of the stockholders. They are completely amenable to control by the owners or the majority stockholders.

Coming from a corporation in which there is this majority stock interest we come to a corporation in which there has been such dilution of stock ownership by wide sale that there are no blocks of shares sufficiently large to create a majority stock ownership. This results in minority stock control. Immediately one begins to see how dangerous such a development in corporate structure may be for the owners of the corporation. A minority block may be insufficient in size to control the conduct of the business by controlling the acts of the board of directors. Such a board may work its will as it pleases, even defying the demands of the owners. The classic example of such defiance is the Standard Oil Company of Indiana. Here the chairman of the board of directors, Colonel Stewart, defied John D. Rockefeller, Jr., representing the chief minority stock interest, in the conduct of the corporation, so that Mr. Rockefeller had to spend millions to procure proxies sufficient to enforce the will of the owners on the management. Herein we see the danger that comes when the affairs of the corporation are placed in the hands of a board of directors not completely subject to the will of the owners, or to the will of those who have rightful claims to priority in the corporation.

Next we come to what is called management control of a corporation, which is best exemplified by the Ameri-

can Telephone and Telegraph Company. I have a younger brother who is a general manager and vice-president of one of the subsidiaries of this corporation, and I know just how much attention would be paid to any representation to him or his associates by a stockholder in the matter of administering the corporation. The stockholder would be received with the greatest courtesy, but when he left the office the matter would be pigeonholed. The chief characteristic of this form of corporate structure is that absolute control is exercised by a board of directors; the stockholders are completely impotent because of dilution of their powers by the excessive distribution of stock. Thus the owners of a corporation can lose control of the corporate structure that they own and have created. This situation parallels our own, in the absence of a stock issuance by our corporation. We now see why we must procure control.

Moving to the nonprofit corporation, we enter the field in which our medical-service corporation will be chartered. In the usual philanthropic, nonprofit institution, there is no great concern over where control of the corporation resides, or what extent of control the owners of the corporation have over the board of directors. For instance, the Home for the Blind in Worcester has been endowed with funds and established, and there is little more to be done other than to conserve the funds and to carry out the corporate purpose of maintaining a home for the blind.

Next in the line of nonprofit corporations from which we can draw instruction is the Blue Cross. There are vital differences between the Blue Cross and what will be our corporation for medical service. The Blue Cross has been established as a sort of insurance go-between for the patient and the hospital corporation. The Blue Cross has no power over the individual corporate structure of hospitals; the individual hospital corporation is still in full control of its own destiny. The hospital directors are in no way controlled by the Blue Cross.

But when we move on to the formation of a medical-service corporation, a nonprofit corporation, we cannot afford to take the viewpoint that its setup is as innocuous as that of the Blue Cross. The physicians of the State, who are in complete control of the profession of medicine, are planning to place a large part of their practice under the control of a corporation by the medium of a contract. There is no stock ownership so that we cannot control this corporation through the medium of stock ownership. We have to adopt other measures of control if we are to protect our inalienable interests.

Those of us who have been interested in the philosophy of corporate structure in America know that in recent years two hundred corporations have achieved control of 50 per cent of the entire corporate wealth of the United States and control some 15 per cent of the employed workmen of America. I shall cite one authority on the growing separation of ownership in a corporation from control, so as to impress you with the importance of control—the statement of Justice Brandeis in the case of Liggett versus Lee (288, U. S. 517 [1933], p. 548):

> Ownership has been separated from control; and this separation has removed many of the checks which formerly operated to curb the misuse of wealth and power. And as ownership of shares is continually becoming more dispersed, the power which formerly accompanied ownership is becoming increasingly concentrated within the hands of a few. The changes thereby wrought in the lives of the workers, of the owners, and of the general public are so fundamental and far-reaching as to lead these scholars to compare the evolving "corporate system" with the feudal system; and to lead other men of insight and experience to assent that this "master institution of civilized life" is committing it to the rule of plutocracy.

The control that we should establish over the corporation ought to be based, first, on this background of principles and facts that we have just discussed; secondly, it should be governed by the principle that all distinctly professional matters should be kept in the hands of the physicians; thirdly, the organization should be so arranged that in the future such power over professional matters should not be allowed to get out of the hands of physicians; and fourthly, we should keep in mind the necessity of procuring an intelligent representation of the public in this program.

Turning now to the diagram or pattern of our corporation, there are three major subdivisions of the corporation: that division wherein we establish a voting membership; that wherein we establish a managing body or board of directors; and that wherein we create for the district societies the very highest degree of home rule by establishing units, which will carry out locally the purposes of the corporation.

In brief outline, we have established the Executive Committee of the Massachusetts Medical Society, composed of twenty-three members, as the voting members. This is the only point at which physicians, who are entitled to controlling powers, can enter this corporation, other than by comprising a majority of the directors. The latter has many undesirable aspects, which I shall discuss later. We first had all the members of the Council as voting members, but as we discussed the problem we thought that for the sake of functioning satisfactorily, it would be better to have a small group of physicians as voting members, who would be definite representatives of the Society as a whole, because we must visualize that once this corporation is established it will practically run itself. The Executive Committee will be more or less what you might call the watch-dog of the system, seeing that nothing which jeopardizes the rightful and proper interests of physicians takes place. This is the group in the corporation which has control of the corporation by virtue of the powers granted them in the by-laws: power to appoint directors; power to remove directors; sole power to change the by-laws, which perpetuate their powers; and power to review vital actions that will arise.

The number of the Board of Directors, the second group on the diagram, has been set at fifteen. One third shall be physicians; one third, as required by the enabling act, shall be subscribers; and the other third may be made up of prominent laymen. If this corporation assumes the proportions that we believe it well may, there are certainly going to be distinct problems of administration and of finance with which the directors must concern themselves expressly. Hence, we must have a setup that will allow us to call on suitable persons in the community to assist in carrying out these parts of the corporate responsibility. To return to the alternative proposition, if we were to seek to control the corporation by putting in a majority of physicians as directors, we should create a situation wherein we could not call on that powerful, intelligent body of citizens whom we need to assist us. Let us assume there is a board of fifteen directors. If a third, or five, are subscribers, and a majority, or eight, are physicians, one would not secure, we believe, in the two remaining appointments sufficient representation of those lay people from whom we need so much help. So in rejecting, as impracticable, control by a majority of physicians as directors, we have substituted what seemed to us to be a fair and effective setup, in which the physicians will have

unquestioned control of their own professional concerns. This is achieved by allocation of control over such questions to the Central Professional Service Committee, which is composed, with one exception, of physicians. We have delegated to them sole power to initiate action on vital medical matters. With reference to such matters, only these physician-directors can initiate alteration of the rules and regulations, which will emanate from this body, the Council of the Massachusetts Medical Society. As the doctors are the producers and distributors of medical care, a board of directors should properly be our representatives. Since we are creating a board of directors with lay and subscriber members, we are justified in protecting our quasi-ownership rights by this indirect method, thus keeping vital medical matters in the hands of bona-fide representatives of the medical profession.

MASSACHUSETTS MEDICAL SERVICE CORPORATION

Massachusetts Medical Society

1. Creates corporation
2. Controls it, by district elections, through the voting members

Voting Members of Corporation

(The 23 Members of the Executive Committee of the Council of the Massachusetts Medical Society)

1. Elect Board of Directors
2. Terminate directorship
3. Change by-laws
4. Receive notice of changes by the Central Professional Service Committee

Board of Directors

(5 Physicians; 5 Subscribers; 5 Unspecified)

1. Supervises and controls administrative matters with
   a. Medical director and assistants
   b. Administrative Committee(?)
2. Supervises and controls financial matters with
   a. Administrative group
   b. Finance Committee(?)
3. Appoints Actuarial Research Committee (at least 3 members)
4. Appoints Central Professional Service Committee (5 members, of whom chairman and 3 others must be physicians); this committee has sole power to initiate changes, reporting them to the voting members, on the following:
   a. Extent of medical benefits
   b. Basis of compensation
   c. Standards of medical care
   d. Discipline of physicians
   e. Qualifications of specialists
   f. Extension of income groups

District Administrative Units

(Majority Physicians; Chairman Physician, Elected by District Societies)

1. District administrative committees
2. District professional service committees (all physicians)
   a. Have sole power of concurrent action with the Central Professional Service Committee
   b. Supervise locally the quality of medical care
   c. Discipline local physicians
   d. Determine qualifications and furnish lists of local specialists for the benefit of subscribers (optional)

In the local communities we have established district administrative units, the third section of the diagram. Each is composed of not more than nine individuals, of whom a majority must be physicians engaged in active practice. We have arranged for the chairman to be a physician, since any committee is apt to be strongly influenced by the chairman. Certainly we must guard this opportunity of protecting the medical aspect of local problems. Under the setup, there is a district administrative committee endowed with administrative powers only, and a professional service committee composed of physicians, which has complete control of all medical matters.

To go into more detail concerning the powers of these three segments of the corporation, the members of the Executive Committee of the Society (voting members) are destined to control it. They have given to them the power to elect the board of directors. The enabling act states that a majority of directors shall be approved by the Massachusetts Medical Society. That does not commit us one way or the other on the election of the directors, so we choose to elect all of them. If the subscribers find some way of nominating their representatives, certainly in view of our power to elect, this is acceptable. When I say our power I mean the Executive Committee's power to elect the directors, a majority of whom are acceptable to them. They have power to terminate directorship. This is nothing unusual in corporate practice; indeed, in all business corporations it is stated that the members may, with or without cause, terminate the tenure of office of any member of the board of directors.

This draft states definitely that amendments to the by-laws are in the hands of the members of the corporation. That provision is based on accepted legal practice. We are doing some things a little differently from the usual practice, but certainly we are doing something different when we place the practice of medicine in the control of a corporation. This grants to us control of the elemental provision that any change in these vital matters shall be initiated by the physicians. It also preserves to the Massachusetts Medical Society control through its voting membership, which has been vested in the Executive Committee of the Society.

The fourth provision is that the voting members shall receive notice of changes contemplated by the Central Professional Service Committee. It is stated in the by-laws that the president of the Massachusetts Medical Society be notified, but I think it might be well to change the designation to the voting members, who include the president of the Society; thus all the members would receive notice of any pending change. This whole group shall receive a thirty-days' notice of any change in the essential medical matters, passed on by the Central Professional

Service Committee. It is provided in the by-laws that any three members of the Executive Committee may call a meeting of the members so that if by mischance any questionable act has occurred or is contemplated by any group in power, a meeting of the members may be called to discuss that change. I think we have preserved to the physicians an adequate measure of control of the corporation, since the members have power to withdraw written approval of the majority of the directors, or even to terminate their tenure of office, at any time.

Coming now in detail to the Board of Directors, with reference to the provision for one-third subscribers, there is one fact which interested the group when we were discussing this set of by-laws — which, by the way, has been approved in principle by the Commissioner of Insurance. The counsel for the Commissioner pointed out to us that at one point in its existence the financial sheet of the Blue Cross was in such shape that, but for the wide subscribers' interest in the corporation, its activity might have been discontinued. So that in the early period of its life, our corporation should have a protective subscriber interest, which will help to tide us over the period when the financial status of the corporation will be subject to quite careful scrutiny by the Commissioner of Insurance.

With reference to the other third of the directors, as I have said, if this program develops successfully we shall need capable public-minded citizens in this corporation. The by-laws are drawn in quite general terms not committing the corporation to questions of what committees shall be formed. We believe we should permit the directors to meet and to organize themselves as they find the requirements of the situation demand. We should not tie them down. In the by-laws we have, in general terms, made it possible for them to establish such committees as they find necessary to run the corporation. We have not concerned ourselves in the by-laws with the problems of the medical director, because we cannot now discern the respective duties of the medical director and the Board of Directors. Their functions should not be strictly limited in the by-laws, and must, of course, be worked out with experience.

In the by-laws, however, we do commit the Board of Directors to establish two committees: the Actuarial Research Committee and the Central Professional Service Committee. We think that the Actuarial Research Committee should be established for very definite reasons. There is no sound actuarial basis for setting up such a program as this: it is purely experimental. In this connection, I quote from an address by Mr. W. A. Milliman, assistant actuary of the Equitable Society, speaking in New York City before the Actuary Society of America. He said, "Despite the enormous amount of effort that has gone into studies of the cost of insuring medical care, there is very little data on which an actuary could rely in calculating the costs of these benefits." I also have a report of the Committee on Economics of the Canadian Medical Association, which was made as far back as 1934; on the subject of actuarial experience, it states, "Sickness risks do not lend themselves to actuarial calculations."

Even though a capable board of directors might plan to appoint such a committee, we thought it best to require the appointment of such a committee immediately, since our whole welfare is at stake in this project. That would assure us a sound study of actuarial bases in so far as they can be made from the very beginning of the corporation's life.

The other provision of the by-laws binds the directors to establish the Central Professional Service Committee. There is also provision in the by-laws for delegating to this committee sole power to initiate all changes in the rules and regulations concerning vital professional matters. This retains in the hands of the profession control of those matters that the English physicians at first lost under compulsory insurance, and then recovered only after years of bitter struggle.

While we studied the probable functioning of a medical-service corporation, we selected six functions (designated "*a*" to "*f*") of the Central Professional Service Committee as matters of vital medical importance over which physicians should be entitled to control as the quasi-owners of medical practice. So far as it is possible to designate "property rights" in a professional service, these functions seem to cover our property rights. Such rights have been defined as "control of access to the instruments of production." These functions infringe on the right of the individual physician to practice his profession; and they relate to changes of policy by the corporation which might jeopardize his security in such practice.

Let us consider the subheadings in detail. (*a*) *Extent of medical benefits.* From the experience of the Blue Cross we know that problems relating to how much x-ray examination, how much anesthesia and how much of any other special service shall be included in a sanely rounded program must arise. Only physicians are equipped to solve such problems. (*b*) *Basis of compensation.* This does not relate to how much shall be paid specifically for a certain service. It has reference to the fact that only physicians are qualified to determine what the proportionate return for an appendectomy as compared with a resection of the colon or the home treatment of pneumonia shall be. (*c*) *Standards of medical care.* This has always been the special province of the medical profession, and our corporation will be based on our ideal of ever-improving standards of medical care. (*d*) *Discipline of physicians.* This relates only to handling the small 2 or 5 per cent of the profession who welfare experience has revealed will intentionally abuse the corporation by overtreating, overvisiting and so forth. We simply believe that such discipline should never be the province of laymen, as it is in some foreign compulsory insurance schemes, but that physicians only should be allowed to judge practitioners of medicine in these matters. (*e*) *Qualification of specialists.* This concerns only allocation of authority. It assures us that if, as and when the Massachusetts Medical Society acts on this matter, then under our corporation the matter will be handled by properly accredited physicians and not by laymen. No action on this matter is entailed by acceptance of these by-laws. (*f*) *Extension of income groups.* The Council has already voted that any determination or extension of income groups privileged to receive benefits from the corporation shall be voted on by the Council. This action is safeguarded by this provision and other provisions in the by-laws.

In the local professional-service committees, the right to act with the Central Professional Service Committee on such of these headings as have important local significance has been established. These include the supervision of the local quality of medical care, the local discipline of offending physicians, and the local handling of the specialist problem, when the society shall have decided on a course of action.

I am briefly going through the by-laws to point out the sections that carry out the purposes we have in mind. Of the 350 lines in these by-laws, roughly 200 lines are concerned with purely legal matters, whereas only 150 lines are pertinent to vital medical aspects. I shall indicate these pertinent lines.

Article II, Section 1, establishes the members of the Executive Committee of the Massachusetts Medical Society

as the voting members of the corporation. Section 4 gives power to three of the committee to call meetings whenever they believe that action should be taken.

Article III, Section 1, gives to the Board of Directors the necessary powers to manage the corporation, and it states the composition of the Board of Directors. Section 3 gives the members the voting control for the removal of directors if it is deemed necessary. That is one point where the Commissioner of Insurance has reserved a question. He has not yet committed himself, but he has reserved the right to question whether the phrase "with cause" should or should not be inserted: nothing more vital than that. As I have already said, most business corporations can remove directors with or without cause. Section 7 allows the Board of Directors to adopt rules and regulations subject to the conditions of Article IV. That simply means that any rules and regulations that are primarily established will not be modified if they relate to the vital medical matters unless initiated by the Central Professional Committee and reported by it to the Executive Committee of the Society (voting members). Section 9 establishes the general power of the directors to delegate power so far as they see fit to committees and officers, but subject to such regulations as may be adopted by the board and restricted by the provisions of the by-laws.

Article IV, Section 1, is to be changed as follows: "There may be appointed such committees as the directors deem necessary, and there shall be appointed an actuarial research committee and a central professional service committee." This simplifies the problem of appointive power. Section 2 gives, so far as we could assure it, complete control in vital medical matters to the Central Professional Service Committee, and thus indirectly to the Massachusetts Medical Society through its chosen representatives. Section 3 specifies the fact that only in this committee shall action on these vital medical matters be initiated. Section 4 simply provides a means for setting up as fair a basis as could be established for handling disputes or, rather, abuses by physicians. It does not carry through the final action, which is determined by the enabling act, which requires that action shall go to a special committee consisting of the Commissioner of Insurance, the Commissioner of Public Health, and the Attorney General. But by the provision of the by-laws, many minor disputes may be quickly disposed of without loading busy public officials with the innumerable little problems that must necessarily arise. Sections 6 and 7 relate to the establishment of the Actuarial Research Committee, to which shall be submitted all questions relating to actuarial studies.

Article V relates to purely legal matters, and any question there should be referred to a lawyer: nothing vitally affects the pattern of our corporation.

Article VI, Section 1, relates to the action of each district society, to which, if this program is going to succeed, such matters should eventually be referred. Section 4 designates a subordinate local professional-service committee to act in an advisory manner in conjunction with the Central Professional Service Committee.

Article VIII makes it possible for us if we wish, and as the other states have found it advisable to do, to offer limited policies in addition to complete medical-service policies. When the income level is established by the Council, people below that level can get complete medical-service contracts; above that level people may buy a policy for which they will receive compensation from the corporation. But the limited contract in no way binds the physician in his charge to the patient, so that the present relation which exists between the physician and the patient continues to hold. By this means we make an effort to reach the higher income group, taking care, however, to impose certain restrictions, which do not obtain in the lower income group. As our approach to the lower income group depends on the good will of the upper income group, we win their support by a limited subscribers' contract. Section 5 is a general provision included so that, if at any time it is the will of the Council to permit certain charitable organizations, welfare boards or other groups to participate in the payment of premiums, this may be done without discussion or change in the by-laws.

Under Article VIII, Section 3, there is a phrase at the end that may be difficult to understand. I refer to, "He shall not have the right to refuse to accept a subscriber as a patient or to continue treatment of a subscriber for the sole reason that he is a subscriber." The only reason for the statement is that if we are going before the public with an appeal for subscriptions, they will insist that the subscriber have this protection. As our lawyer, Mr. Twomey, put it, if they are to join this corporation which is controlled by physicians, subscribers should be assured protection from discrimination in favor of those who are paying patients.

Article IX, Section 1, leaves the question of amendments or any changes in the by-laws to a majority of the members of the corporation. The counsel for the Commissioner of Insurance asked us to change this to read "by a vote of 15 members." Our purpose is that the powers of the members cannot be altered by changes in the by-laws other than those to which the members subscribe. The physicians cannot be displaced from voting membership, which gives them the powers indicated and hence, ultimately, control of the corporation.

We have presented the type of corporation embodied in the by-laws to you, hoping that we have sensed the will of the majority of the Society. We ask you to consider these by-laws from the viewpoint of acceptance or rejection, or from the viewpoint of modification. If your decision is that these be rejected, then we ask you to outline the type of corporation you want. We cannot proceed to the rules and regulations until the character of our corporation is determined, so that we can refer rules and regulations to some definite pattern.

We have outlined for you the pitfalls in creating a medical-service corporation. We have presented a specific set of by-laws that create a corporation which, we hope, will meet with your approval. In asking for action on these by-laws, we suggest the necessity of committing yourselves to a specific type of corporation. In making your decision you are restricted in your choice to one of the small number of types of corporations that have appeared on the current scene. They are:

1. *Compulsory health insurance*, in which control of the corporation resides in a federal or state bureaucracy. This type of corporation we hope to avoid permanently.

2. *Lay-group* (nonpartisan) *corporation*, in which a group of disinterested laymen organizes a medical-service program and, hence, controls the board of directors. It is only by their grace that a group of physicians can control the medical problems. By the same token, they can deny the physicians control over these matters.

3. *Consumer co-operative*, in which a group of nonproducers controls the producers of medical service, insofar as they appoint and control the directors. As only 5 per cent of the members of a consumer's co-operative retain supervisory interest, this means that a small handful of nonproducers controls the producing group. They may delegate powers over medical matters

to a group of physicians, but they may easily withdraw this provilege, since they control the directors and, hence, the by-laws. This is a precarious basis on which to risk the security of one's self and family.

4. *Medically controlled corporation.* With proper arrangement for protection of the rights of the subscriber, this is the type of corporation to which the bulk of physicians subscribe. Control may be achieved directly by placing physicians in control of the board of directors. This has evident drawbacks, as has been indicated. The other alternative is to achieve control of the vital professional problems indirectly, as we have done, by empowering a subcommittee of physicians to initiate all action on such matters. This represents an even more complete control of these vital matters by physicians than is assured in the setup with physicians constituting a majority of the directors.

ELMER S. BAGNALL
THOMAS H. LANMAN
PEIRCE H. LEAVITT
SHIELDS WARREN
JAMES C. MCCANN, *Chairman*

APPENDIX NO. 7

REPORT OF THE COMMITTEE ON POSTGRADUATE INSTRUCTION

Since the annual meeting, the committee has arranged a curriculum for the postgraduate extension courses for the academic year of 1941–1942; this has been sent to each district postgraduate chairman. Courses will start as soon as proper arrangements are completed.

Owing to a curtailment of governmental funds, the general courses will be financed by a registration fee of $5.00 for each physician who takes the courses. If any district wishes a postgraduate extension course on venereal disease, this will be given free; the expense will be met jointly by governmental agencies and the Society.

The committee has co-operated with the other New England state medical societies in organizing the fourth New England Postgraduate Assembly, which will be given at Harvard University, October 29 and 30, 1941; announcement has been made in the *New England Journal of Medicine*, and programs have been mailed to all legally registered physicians in New England. Further reports on these activities will be made at subsequent meetings of the Council.

REGINALD FITZ, *Chairman*
LEROY E. PARKINS, *Secretary*

APPENDIX NO. 8

REPORT OF THE COMMITTEE ON CONVALESCENT CARE

Since 1938 the Committee on Convalescent Care of the Hospital Council of Boston has been concerned with the adequacy of facilities for convalescent care and has made an investigation of private nursing homes within a reasonable radius of Boston.

On January 9, 1940, a meeting of hospital superintendents and medical social workers was called by the committee to discuss the findings in connection with visiting nursing homes and setting up the Nursing Home Information Bureau. It was found that more than 90 per cent of the patients in these nursing homes were chronic and aged, and the committee raised the question as to whether the needs of this group should not be studied. The committee was urged to turn its attention to a study of the entire question of placement of patients in these nursing homes, both from the point of view of hospital administration and the medical social workers.

The committee therefore voted to secure a complete record of discharges from in-patient services referred to medical social service departments for aftercare for a six months' period, to obtain information as to the number of individuals involved, the types of care requested and the final disposition of each case.

The first half of the study covered the three months' period of March 18 through June 18, 1940, and the second period was from November 1, 1940, through January 31, 1941. A preliminary summary report of the findings follows. This summary report represents data presented for consideration to the Committee on Convalescent Care of the Hospital Council of Boston.

* * *

Hospitals Included in Study

One tax-supported and nineteen voluntary hospitals were asked to participate in this study and to fill out a card for each discharge referred to the medical social service department for some form of aftercare. Fifteen institutions returned cards for the study. The number of patients referred for aftercare in the individual hospitals ranged from 1 to 219. Five hospitals sent in no cards. This was due to the fact that they have no social service departments and that the hospitals were not requested to make provisions for aftercare.

Number of Cases

It is interesting to note that there were fewer requests for aftercare during the second period of the study, that is, from November 1, 1940, through January 31, 1941, than from March 18 to June 18, 1940, the figures being 710 and 604, respectively.

Sex, Racial, Religious and Age Incidences

One thousand three hundred and fourteen individuals were referred to the medical social service departments of the fifteen hospitals for the provision of some kind of aftercare.

Of these, 560 were males and 752 females (no report on 2); 1242 were white, 63 colored and 3 yellow (no report on 6); 453 were Protestants, 592 Catholics and 230 Jews (no report on 39); 58 were under eighteen years of age, 899 between nineteen and sixty-five and 317 were over sixty-six (no report on 40).

Care Provided

Own home. Five hundred and fourteen patients returned to their homes or the homes of relatives. Of this group, 239 received care from a visiting nurse and 25 received care from a practical nurse or registered nurse or were assisted by having a special housekeeper placed in the home. Two hundred and fifty patients returned to their homes with no special nursing care.

Institution or nursing home. Of the total number of patients 768 had some provision made for aftercare away from home. The Committee on Convalescent Care was particularly interested in this group, the type of care required and the facilities that were used for care.

Three hundred and eighty-nine were listed as *convalescent*; 301 were between nineteen and sixty-five years of age (no report on 21). Fourteen received care in tax-supported institutions, 195 in voluntary agencies, 154 in private nursing homes and 20 in special hospitals and sanatoriums; 6 patients were listed as requiring convalescent care but no information was given as to where they were placed. Of those placed in private nursing homes, 18 stayed one week or less; 41 from one to two weeks,

43 from two to four weeks, and 28 over four weeks (no report on 24); 72 patients paid less than $15.00 a week.

Two hundred and eighty-six patients required facilities for *chronic* care; 154 were between nineteen and sixty-five years of age (no report on 13). One hundred and twelve were cared for in tax-supported institutions, 30 in voluntary agencies, 122 in private nursing homes, of whom 78 paid less than $15.00 a week (no report on 42), and 16 in special hospitals; there was no report on 6 patients.

Terminal care was provided for 93 patients; of these, 56 were between nineteen and sixty-five years of age (no report on 2). Twenty-one were cared for in tax-supported institutions, 15 in voluntary agencies, and 47 in private nursing homes (no report on 10); 20 private patients paid less than $15.00 a week.

Thus we find that of the 768 patients for whom care was provided in an institution or nursing home, 389, or 50.7 per cent, were convalescent, 286, or 37.2 per cent, were chronically ill and 93, or 12.1 per cent, needed terminal care.

Adequacy of Care

A report on the adequacy of the care provided shows that in 1072 cases the arrangements made were considered satisfactory; 134 were unsatisfactory; 11 were questionable; 6 patients died before arrangements could be completed; 3 patients were still in the hospital at the time of the close of the study; and there was no report on 88 cases.

The reasons given for dissatisfaction varied. Among those listed were: lack of medical supervision in the nursing home; patient needed more care than available; patient or family refused to accept recommended plan of care away from home; patient complained of care; according to the Nursing Home Information Bureau, the home was not very good, but the family arranged for admission; patient could not adapt to group care in public institution; home conditions poor; patient emotionally restless in new group and missed frequency of doctor's attention received on ward; distance made it difficult for relatives to visit; no occupational therapy in nursing homes; atmosphere of chronic invalidism for convalescent patient.

Diagnosis and Prognosis

No attempt has been made at this time to analyze the diagnoses or prognoses of the cases referred for aftercare or to relate them to any age grouping or type of care recommended.

Charges

The hospitals were asked to indicate the amount paid for aftercare and who paid it, that is, the patient, the social service department or some other private agency. They were also asked to indicate whether the patient paid from public-relief funds. Attention is called to the fact that the privately owned nursing homes are run as a business and for this reason seldom admit a patient on a free basis, although in justice to them, it must be said that in some cases they have continued care on a free basis or for a small charge. Patients admitted to tax-supported institutions are, for the most part, admitted without charge.

One hundred and nine patients were listed as receiving free care; 329 paid for their care; 189 received public funds; 132 had their care paid for in full or part by the social service department; 104 were aided by other voluntary agencies.

T. Duckett Jones
Henry E. Gallup

* * *

After nearly three years of study of the needs of convalescent patients and existing facilities for their care, it has been found that convalescent care merges into the care of the chronic patient and the latter into the problem of caring for the aged. The privately run nursing home is essentially a home for aged persons with their chronic ailments. It is not a solution to the problem of convalescent care except for patients who can pay the higher rates in the better homes.

This committee is concerned chiefly with providing *new* facilities for the convalescent patient discharged from the wards of hospitals belonging to the Hospital Council and from other agencies in Boston, for example, the Community Health Association.

As a result of the tabulations recently made by medical social workers, it has been found that although the problem of convalescent care is an acute one, it is not so great numerically as had been anticipated. The committee is agreed that, although the tabulations show that there is need for facilities for an equal number of chronic patients, who would require longer periods of care, it is the function of this committee to concentrate on a solution, first, of the convalescent problem.

The committee also believes that there is more information to be secured from the study with relation to the chronic patient and that, when the convalescent question has been reasonably well solved, attention should be focused on the chronic problem. Further consideration of these problems will constitute the immediate deliberations of the committee.

T. Duckett Jones
Henry E. Gallup

APPENDIX NO. 9

Report of the Committee Appointed to Support an Appropriation by Congress for the Construction of a New Building to House the Army Medical Library and Museum

Word has been received from the Surgeon General of the United States Army in regard to the present status of the projected Army Medical Library and Museum. Final clearance of the site has been approved by the National Capitol Park and Planning Commission. That commission and the Fine Arts Commission have approved the design of the building and its setting on the designated site. The building is to occupy a block directly across the street from the Senate Office Building and adjacent to the Library of Congress on Capitol Hill.

A bill for the purchase of the land, authorizing $1,000,000, was approved by the Bureau of the Budget, passed by the House of Representatives, approved by the Senate Military Affairs Committee and on August 15, 1941, was before the Senate itself. In addition, funds for architects' fees have already been authorized and a contract has been made with Eggers and Higgins, who are now engaged in the preparation of plans.

Henry R. Viets, *Chairman*
Robert B. Osgood
Benjamin Spector

APPENDIX NO. 10

Report of Special Committee to Equalize Distribution Among Physicians of Medical Service to WPA Employees

Each month since our last report, a member of our committee has visited the WPA office in Boston, checked the records of payments to physicians and discussed matters relating thereto with Mr. Burns, State Compensation Of-

ficer. Very little of a controversial nature has arisen. Perhaps this is in considerable part due to the marked decrease in the number of WPA employees, with a consequent reduction in the number of those injured. In August this year the average number carried on the WPA rolls was 37,622 employees; in contrast, in 1938 the number was 126,165. The years between 1938 and 1941 show a progressively consistent decline in the number of those employed.

While on figures, an error made in the copying of our last report should be corrected. In the last paragraph of that report, it should read as follows: "$1,047,401 has been spent for the total care of the approximately 85,000 injured workmen." This means a little more than $12.00 for each case treated. The WPA office feels that this figure compares favorably with the amount paid for compensation cases in this commonwealth, which is approximately $23.00.

In our last report to the Council it was stated that the State Compensation Officer and the committee planned to make $500.00 the top at which a physician's name would be removed from the list of available physicians. An advisory letter from the Commission in Washington resulted in a change in this figure, and it was made $1000.00 instead of $500.00. Since about June 1, then, the $1000.00 top has been in operation. Orders went out to all WPA timekeepers that no injured workmen be referred to any physician who had received that amount, or more, in fees from this type of work since its inception. Exception was to be allowed if the injured party specifically requested his family physician.

Under the date of May 10, 1941, a new ruling was made by the Commission in Washington. It did not come to our attention until after the meeting of the Council in May. To quote from this ruling: "In *doubtful* cases injured employees may *not* indicate their personal preferences, and shall *not* be referred to physicians of their own choice. Where federal medical facilities are not available, doubtful cases shall be referred by the project timekeeper to specially qualified physicians duly licensed under the state law to engage without limitation in the practice of medicine and surgery." The Committee did not favor this ruling, but experience had been bad with free choice according to the Commission, and we were not successful in our attempt to have it reversed. It was not deemed wise to make an issue of it, especially as it would include but a very small proportion of the cases. No complaints have been received as yet, and this rule has been in effect for several months.

With such a sharp reduction in the WPA rolls, the work of this committee should noticeably decrease. Regular formal reports to the Council may be omitted unless matters of importance arise.

GUY L. RICHARDSON, *Chairman*
WILLIAM E. BROWNE
LUCIEN R. CHAPUT
DANIEL J. ELLISON
FRANCIS P. MCCARTHY

APPENDIX NO. 11

REPORT OF COMMITTEE FOR STUDY OF PRACTICE OF MEDICINE

Although this committee was appointed in the spring of 1941, its assignment is no new interest of the Massachusetts Medical Society. One hundred and sixty years ago our society was chartered, among other things, to examine candidates for the practice of physic and surgery and to grant letters testimonial of the examination of such as were found skilled in their profession. The thoroughness with which this was carried out has been recalled recently by the publication in the *Journal* of an account of the examination of John Fleet in 1788.* There were controversies in those days, too, but they were smoothed without great difficulty, and the Society continued to protect the people against "those who may ignorantly and wickedly administer medicine" until 1894, when Massachusetts adopted its medical practice act. The story of these first hundred and twelve years is told in Chapter IX of Dr. Burrage's *History of the Massachusetts Medical Society*. It is referred to here because it establishes the fact that the Massachusetts Medical Society has traditionally upheld the highest standards of medical education and practice, and suggests that it should continue to do so.

The highest standards of medical education and practice are no longer maintained in Massachusetts. Here are the plain facts. In 1940, Massachusetts registered as many graduates of unapproved schools as did all the other states of the Union combined. In 1940, Massachusetts registered more graduates of unapproved and foreign schools (for which we have no method of approval) than she did graduates of the approved schools, including diplomates of the National Board of Medical Examiners. The data for the following tabulation are taken from the compilations of the American Medical Association:†

MASSACHUSETTS LICENSURE FOR 1940‡

STATUS	APPROVED SCHOOLS	NAT. BOARD MED. EX.	UNAPPROVED SCHOOLS	FOREIGN SCHOOLS	TOTAL
Examined	110	0	303	223	636
Passed	101	113	125	112	451
Failed	9 (8%)	0	178 (59%)	111 (50%)	298 (47%)

‡This tabulation has been changed from that presented to the Council on October 1 by the addition of the figures for those registered through endorsement of National Board Examinations.

This lamentable state of affairs has come about because the Massachusetts medical practice laws are geared to the nineteenth rather than to the twentieth century. The Association of American Medical Colleges and the American Medical Association have been raising the standards of medical education now for many years. As the medical schools became graded and improved, most state licensing boards began to take an interest and to co-operate in the formulation of new legal requirements that embodied the same educational ideas. Whereas only five state licensing boards refused to recognize the low-grade schools in 1904, the number of such boards had risen to forty-six by 1925. The fact that Massachusetts, in 1941, continues to recognize them means that for fifteen years we have been absorbing the country's second-rate educational output. For those who have practiced medicine for twenty years or more in any part of the Commonwealth figures are not needed to establish this fact — indeed it is a notorious fact throughout the rest of the United States that we are beginning to feel the effect of allowing our state to be the dumping ground for poorly trained physicians and surgeons.

The responsibility for this state of affairs is not easily placed. There are half a dozen things which might or might not have been done in the past, and there are a dozen reasons why they were or were not attempted. The present status is that although we are still operating under what a member of our own state board has called an "out-of-date and clumsy medical practice act," we have a State Approving Authority, which we expect will be able in 1945 to separate out and refuse the privilege of examination to graduates of medical schools that are not in its

*Fleet, J. A fiery ordeal. *New Eng. J. Med.* 224:1006-1014, 1941.
†Medical licensure statistics for 1940. *J. A. M. A.* 116:2021, 1941.

opinion living up to the present-day standards of medical education. It would seem to be idle to develop controversies now, when we are hopefully awaiting the tardy operation of this state authority, which was designed for and may yet be found to supply the necessary relief. This authority has no easy task before it. Controversies within the profession cannot help it and may supply material for political resistance to the consummation of its effort. We should support it firmly to the end that it may establish itself as completely and satisfactorily in Massachusetts as other similar authorities are already established in other states. Such support, however, need in no way deter us from an advance consideration of what our course should be if this authority is forced to succumb to opposing minorities in 1945.

If, in 1945, we find that we are merely awakening from a dream and that, in spite of our efforts and opinions, the people of Massachusetts wish to leave their backdoor open to the poorly trained physicians of the entire world, there is no reason why we should continue to pretend that the standards of the Commonwealth are sufficient for membership in our society. To do so would be contrary to the past history of this society and of all reputable medical organizations. The trial of the American Medical Association in Washington at least determined that a medical society has every right to maintain high professional standards of membership.

Those who now come into the practice of medicine through the approved channels of medical education have been highly selected, not only as to their scholastic aptitudes (which is all that any examination can cover) but on personal grounds as well. This selection, beginning in college and continuing through medical school, is an expensive process, and although it does not weed out all the undesirable elements it comes as close to that accomplishment as possible. This is recognized by the Council's annual approval of the list of medical schools and colleges prepared by the Committee on Medical Education, and by Chapter V, Section 2 (*a*) of the by-laws, which provides for the admission of the graduates of these medical schools and colleges into the Society. Under Chapter V, Section 2 (*b*), however, the by-laws provide the machinery for admitting graduates of schools *not* recognized by the Council. The propriety of this arrangement rests on the assumption that the Society is willing to admit to fellowship graduates of schools which it is unwilling to recognize. This is a good democratic assumption, but if it is allowed to operate indefinitely, it encourages the schools concerned to continue their resistance to inspection and improvement, and cannot but discourage the embryonic State Approving Authority in the initial efforts of what we have admitted is a difficult task. If we believe, and want the members of the State Approving Authority to believe, that the present standards of medical education are worthy, fair and just we should consider whether our requirements for admission to fellowship should not be as unequivocal as those of the United States Army, Navy and Public Health Service or of the National Board of Medical Examiners — not to mention most of the other states in the Union; that is, whether we have been too freely invoking Section 2 (*b*) under Chapter V of the by-laws.

This question is brought up now because it suggests a possible concrete step to be taken some few years hence. Consequences which might reasonably be expected to follow such a step may now be outlined. The better hospitals of Massachusetts would doubtless continue to require membership in the Massachusetts Medical Society as a qualification for staff membership. Their standards would thus be supported and gradually raised, and the medicine and surgery practiced within their walls would continue to improve. The nonconforming type of hospital, on the other hand, would be more conspicuously placed as an institution of lower standards. This would tend to concentrate the responsibility for the practice of good surgery even more emphatically where it already rests — in the hands of the hospitals. It is the opinion of this committee that the responsibility for the practice of surgery belongs in the hands of the hospitals, and that practical regulation can best be approached through registration or supervision of these institutions. It so happens that current legislation has been enacted charging the State Department of Public Health with responsibility for the licensing of hospitals and for setting standards for hospital equipment, records and so forth. The committee therefore recommends that the Massachusetts Medical Society heartily co-operate with the Department of Public Health in meeting this responsibility.

In summary: The standards of medical practice in the Commonwealth of Massachusetts are low. An attempt is being made in good faith to raise them through the establishment of the State Approving Authority. Controversies among those who are actively supporting this attempt are embarrassing and should be avoided. If the authority is obstructed in bringing about a higher standard of medical practice in Massachusetts, this society need no longer invoke Chapter V, Section 2 (*b*) of its by-laws, and may thus return to its traditional policy of supporting the highest standards of medical education and practice. This is a decision for 1944. Whether or not such a policy on the part of the Society becomes desirable at that time, an opportunity to co-operate with the State Department of Public Health in its licensing of hospitals is now at hand. The committee recommends that this opportunity be seized as an immediate step toward improving the practice of medicine and surgery within the Commonwealth.

DWIGHT O'HARA, *Chairman*

MEDICAL PROGRESS

METABOLIC FACTORS IN THE CAUSE AND CONTROL OF DENTAL CARIES

ALLAN M. BUTLER, M.D.*

BOSTON

IN 1931, Hanke[1] wrote, "The literature pertaining to dental pathology is a chaos of facts and fiction (the latter being the outcome of a hyperenthusiastic championship of a fixed idea) . . . ." In 1933, Howe and his associates[2] stated:

> In the past few years, several reports have been made of the arrest of caries through dietary changes in various children's institutions in this country and in England. The preliminary findings of a recent survey carried on at Forsyth Dental Infirmary indicate that results similar to those reported from the institutional studies may be secured by the practitioner who has a working knowledge of nutrition.

This statement and the careful work of Zilva and Wells,[3] Howe,[4] McCollum and his co-workers,[5, 6] Höjer,[7] Wolbach and Howe,[8] Mellanby,[9] Boyle and his associates[10–12] and others on the striking specific effects of vitamins A, C and D on the teeth of experimental animals suggested that the studies of subsequent years might provide objective information that would turn the chaos in the older literature on dental caries into an orderly sequence of established and generally accepted facts.

In 1939, The American Dental Association[13] published a book entitled *Dental Caries: Findings and conclusions on its causes and control.* The one hundred and ninety-five summaries presented therein by observers and investigators in twenty-five countries provide a relatively up-to-date cross-section of the dental profession's opinions on the etiology of "the most prevalent of all diseases." The report deserves careful study, because it depicts dental opinion in 1939 as compiled by the American Dental Association. I believe that it can be visualized without gross misrepresentation by presenting isolated but not distorted quotations from this authoritative source.

DIET IN GENERAL

There is no evidence that caries is produced by malnutrition or may be prevented by adequate diets.

Dentinal caries arise from metabolic disturbances which can be avoided or corrected through the use of diets high in all recognized nutritional essentials.

The author has not observed any favorable results on the progress of caries from changes in diet including additions of calcium, phosphorus and vitamins.

"CIVILIZED DIETARY"

The ultimate causes of caries reside in refinements of civilization and resulting changes of diet. To prevent caries the diet should be "natural" and rich in vitamins and minerals.

There is no basis for the view, frequently held, that freedom from caries in a primitive people is due to nutritional superiority of "natural" as compared with "civilized" diets.

CARBOHYDRATE IN DIET

Sugar or starch has not been observed to favor caries, unless use of either materially diminishes the amounts of ingested protective foods.

Active caries was induced in children by increasing the sugar intake while they were receiving a diet that nutritionally was adequate.

Amount of carbohydrate in the food is not [an] important [factor], provided all essentials are included in the diet.

ORAL BACTERIAL FLORA

No consistent relationship has been found between . . . state of mouth hygiene and activity of caries.

The most constant differential between caries-free and caries-susceptible persons . . . is that of relative number of L. acidophilus organisms in the mouth.

Studies of mouth flora have shown that children, after definite arrest of extensive caries . . . , may show high counts of acid-producing bacteria, especially B. acidophilus.

COMPOSITION OF SALIVA

Chemical analysis of saliva has revealed no correlation with activity or inactivity of caries.

Three factors cause susceptibility to dental caries: . . . (3) lack of sufficient phosphate in saliva to prevent solution of teeth salts by acid under bacterial plaques.

No correlation has been demonstrated between amounts of salivary calcium, phosphorus, chlorides, pH, CO_2-capacity, total alkalinity, total solids or ash and activity of caries.

ACID-BASE BALANCE

The extent of excess of basic over acid metabolic end-products of the diet is unimportant in relation to caries.

The two most important relationships in caries prevention are the acid/base and calcium/phosphorus balances in the body.

No relationship has been demonstrated between intake of calcium, phosphorus or acid-base dietary values and activity of caries.

All articles in this series will be published in book form: the current volume is *Medical Progress: Annual, 1940* (Springfield, Illinois: Charles C Thomas Company, 1941. $4.00).

*Assistant professor of pediatrics, Harvard Medical School, and associate visiting physician, Infants' and Children's hospitals.

CALCIUM AND PHOSPHORUS BALANCES

Retention levels of calcium, phosphorus and nitrogen are not correlated with presence or absence of caries.

Increased retention of calcium favors caries prevention.

There is no proof that addition of milk to ordinary devitalized diet prevents or cures dental caries.

With increased Ca intake [as in milk] there is a decreased tendency to caries.

The phosphorus deficiency theory accounts for . . . caries of pregnancy.

Pregnancy does not cause caries.

HARDNESS OR CALCIUM CONTENT OF WATER

Calcium ladened drinking water does not prevent caries.

There is an inverse relationship between drinking water hardness and caries incidence [that is, hard water does prevent caries].

VITAMINS

Caries arises independently of the amount of vitamin C in the diet.

The dietary factors of chief importance to calcified dental tissues are vitamin D and A and mineral salts.

Addition of calcium and cod liver oil . . . to the diet of a caries susceptible does not reduce the disease.

It is interesting to note that in the general analysis of the findings and conclusions of this book no mention is made of vitamin C.

Naturally, this consolidation of contradictory statements places the conflict of opinion very much in the foreground. On the other hand, the limitation of the quotations to less than one third the contradictory opinions encountered in reading the report indicates that the conflict has not been exaggerated. If the picture is distorted, it is because it includes none of the details that distinguish the controlled experimental evidence obtained by sincere investigators from the theory of pseudoscientific enthusiasts. But the book itself includes no such details in the three pages of introduction or the one hundred and seventy pages of summaries or the fifteen pages of analysis of the findings and conclusions. However, at least three summaries, perhaps best described as fantastic theoretical verbiage, are not only included but also given the importance of being referred to in the analysis of the findings and conclusions. A more recent article by Fleisch[14] extends the theorizing about dental caries to the significance of the vitamin B factors but fails to present any definite facts concerning the role of these substances in the cause or control of caries.

Although Mellanby's experiments on dogs led her to emphasize the importance of vitamin D, calcium and phosphorus in the proper structural development of teeth in dogs, she[15] remarked: "There is as yet little direct evidence of the effect of diet on tooth structure in man. . . . However, a small amount of data suggests that good structure of the teeth in man is obtained by following the same principles of diet which result in good teeth in dogs." Toverud and Toverud,[16] from experiments on dogs, concluded that a diet deficient in calcium, phosphorus and vitamin D during pregnancy and lactation predisposed the offspring to rickets and dental caries. They did not hesitate to correlate enamel hypoplasia and caries. Rosebury and Foley[17] reported that diets deficient in calcium and vitamin D had no deleterious effect on rats during pregnancy and lactation or on their young. Boyle and Bessey[11] stated that the carious processes in the guinea pig do not appear to be associated with defective tooth structure or with dietary deficiencies of vitamins A and C.

Young,[18] from studies with Mellanby on a group of children in Birmingham, believed that there was a significant association between tooth structure and initial caries and spread of caries, and that the ingestion of vitamin D during the period of tooth development before and after tooth eruption diminished the incidence of enamel and dentin hypoplasia and caries. Previously, Hess and Abramson,[19] in reporting studies on a group of institutionalized children, expressed a similar opinion concerning the role of vitamin D, although they called attention to the fact that the permanent incisors, which calcified during the rachitic period, were rarely carious, whereas the second permanent molars, which calcified after the rachitic age, were frequently carious. They further expressed the belief that lack of vitamin B, C or A did not play a significant role in caries. Fish[20] also called attention to the lack of correlation between teeth developed during the rachitic period and teeth having caries. In a recent paper, Boyd,[21] although emphasizing the value of vitamin D, arrived at the following somewhat indefinite conclusion, "The child with active caries must be considered to have a disturbance of metabolism, and this can be corrected most effectively through enrichment of the diet so that it will favor an optimum state of nutrition." Hess, Lewis and Roman[22] and Kronfeld and Schour[23] demonstrated that postnatal nutrition from birth to ten years of age is usually far more important to calcification of teeth than prenatal nutrition is. On the other hand, Toverud and Toverud[16] made much of the effect of prenatal nutrition on the first permanent molars as well as on the deciduous teeth. However, much of their evidence was based on experiments with dogs in which the conditions were extreme. Rare cases of the effect of extreme conditions of prenatal nutrition in man are provided by the structural defects in the deciduous teeth of infants with fetal rickets.[24]

As an explanation of why the hope of more specific knowledge from dental studies has not been fulfilled, certain considerations seem of interest. First, experimentation in this field is recent. Prior to 1920, metabolic research was largely concerned with total energy metabolism or total maintenance requirements and, therefore, did not provide the knowledge and technics applicable to the study of dental physiology. It was only when the establishment and cure of vitamin A, C and D deficiencies in experimental animals became susceptible of accurate control ten to twenty years ago that experiments on mineral metabolism were controlled and that experiments carried out by the investigators mentioned above[3–12] provided accurate information on the effect of vitamins A, C and D on the growth and development of teeth in animals. Secondly, warnings by careful investigators that conclusions concerning the relatively slow-growing or static teeth of human beings could not be drawn too readily from experiments on the rapidly or constantly growing teeth of animals seem to have been ignored by many. Thirdly, the application of this experimental knowledge to the problem of human caries, as indicated by the dental literature, was undertaken largely through studies of two types. One attempted to determine the effect of particular factors on groups of relatively healthy people; in such studies, extreme enough conditions were rarely established to assure predominance of the factor in question. The other embraced surveys of racial groups living under different conditions and consuming different diets. Here, too, control of the various factors in question was extremely difficult. Finally, the tendency to separate dental from medical clinics resulted in relatively few studies on the almost ideal ready-made extreme experimental conditions provided by sick patients in medical clinics. For this or some other reason, much of the very definitive information that has resulted from observations on such patients seems to have received little emphasis. A summary of such information follows.

Albright and his co-workers,[25, 26] Stafne and Austin[27] and Strock[28] have amply demonstrated that patients suffering from the extreme skeletal demineralization of hyperparathyroidism usually show no demineralization of the teeth or increased caries, although isolated cases of caries in such patients may be observed.[29] Maxwell and Miles[30] noted that severe osteomalacia in Chinese women did not result in caries, even though the teeth might fall out. Taylor and Day[31] likewise observed that women in the district of Punjab, India, — suffering from deficient diets, frequent pregnancies, long-continued breast feedings, chronic osteomalacia, tetany and deformities — usually had nearly perfect teeth. Smyth and Goldman[32] observed good teeth in a fourteen-year-old boy with renal insufficiency who had suffered for over a year from the skeletal demineralization of renal rickets. At the Children's Hospital, good teeth have been observed in patients who have had renal rickets for a year or more and who at the time of examination were shown to have marked acidosis, low serum calcium, marked resorption of the supporting alveolar bone, absent lamina dura and generalized skeletal demineralization. Whether the demineralization in these renal cases resulted from the chronic acidosis or the secondary hyperparathyroidism is of no concern. But the fact that patients with chronic renal disease, osteomalacia or osteitis fibrosa generalisata can have extreme skeletal demineralization that does not affect the teeth suggests how little likelihood there is that the teeth are affected by such minor alterations in calcium and phosphorus or acid-base balances as those produced in the group type of experiments on relatively healthy persons.

As early as 1906, Erdheim[33] noted in rats that layers of dentin laid down while the rat was in the hypoparathyroid state failed to be calcified. Albright and Erdheim, in unpublished experiments, later showed that this acalcification of the dentin could be rectified by the injection of parathyroid extract into the rats. Albright and Strock[34] observed that the teeth of children who had developed hypoparathyroidism during adolescence failed to mature after the time of the onset of the disease. The experimental work from the laboratories of Schour[35] and Ziskin[36] confirms these findings. The delayed eruption and maturation of teeth in cretinism is well known. Ziskin and Applebaum,[37] in studying thyroidectomized rhesus monkeys observed both a delay in rate of dentin growth and an alteration in the quality of dentin calcification. Rony[38] reported marked delay in the shedding of deciduous teeth and in the eruption of permanent teeth in a patient with hypopituitarism. The marked rarefaction and fibrosis of alveolar bone with disappearance of lamina dura, resorption of tooth roots and hypercementosis that may occur in Paget's disease do not result in caries.[27, 39–41]

The foregoing evidence for the stability of the structure of the adult tooth in the presence of metabolic disturbances suggests, in spite of the popular belief to the contrary, that the drain on the calcium and phosphorus stores during pregnancy and lactation does not result in the demineralization of the teeth of women at such times. Eaton[42] concluded that any increase in caries during pregnancy was due to laxity in oral

care and not to pregnancy per se. Ziskin and Hotelling[43] stated that "pregnancy is not a cause of dental caries" and that "some factors operating during pregnancy actually prevent tooth decay to a significant extent." Weisberger,[44] in studying a larger group of women during pregnancy and lactation at the Boston Lying-in Hospital and Harvard Dental School, did not observe any increased incidence of caries. Ziskin, Blackberg and Stout[45] described a gingivitis during pregnancy characterized by an epithelial hyperplasia that may well have been associated with some endocrine disturbance accompanying pregnancy. Ziskin[46, 47] has discussed the possible role of endocrine disturbances in hypertrophic and desquamative gingival conditions not associated with pregnancy. His implications concerning the beneficial effects of hormonal therapy need confirmation and obviously may not be applicable during pregnancy.

Bloch,[48] after studying the teeth of children who had manifest signs of vitamin A deficiency in infancy, concluded: "In man, deficiency in vitamin A has no specific injurious effect on the formation and calcification of the teeth. A disposition to dental caries, therefore, cannot be due to deficiency in vitamin A in infancy." Hess and Abramson[19] expressed a similar opinion. Boyle[49] examined the tooth germ of a three-and-a-half-month-old infant who by post-mortem examination was found to have congenital syphilis and the generalized epithelial changes of vitamin A deficiency. Ruling out the effects of syphilis, Boyle concluded that vitamin A deficiency may result in a hypoplasia characterized by atrophy of the enamel organ, with replacement of the enamel-forming cells by squamous epithelium and cessation of enamel formation and by defectively calcified dentin.

Westin,[50] from studies of the scorbutic changes in the teeth and jaws of man, concluded that, although such changes were analogous to those in the guinea pig, none of his findings indicated that scurvy had any decisive effect on the formation of dental caries. All his adult men with scurvy were practically free of caries. Hess and Abramson[19] reported the same experience with children who had had infantile scurvy. Boyle[51] studied the germs of the permanent and deciduous teeth in two cases of acute scurvy in infants eight and eleven months of age. Each tooth germ was essentially normal. Such minor changes as were found in several tooth germs of the younger child were in marked contrast to the striking lesions in the constantly growing incisors of scorbutic guinea pigs. In a later paper, Boyle[10] remarked that, "from the evidence at present available, dental caries in man and in the guinea pig does not appear to be due to a deficiency of ascorbic acid in the diet." He also stated that the clinical reports of Aschoff and Koch[52] and of Westin[53] suggest an immunity rather than a susceptibility to caries in ascorbic acid deficiency. Crandon, Lund and Dill,[54] in their excellent study of acute experimental human scurvy, observed no changes in the teeth of a person who had been on an ascorbic acid-free diet for six months and had definite manifestations of scurvy. They did, however, observe a small hemorrhage at one gingival margin and interruptions of the lamina dura as visualized in roentgenograms. Boyle, Bessey and Wolbach[55] observed in human beings on diets deficient in ascorbic acid a diffuse alveolar bone-atrophy type of peridontal disease similar to the changes that Gottlieb[56] described in pyorrhea. Howe[4] had previously noted that the dental effect of scorbutic diets on guinea pigs "more closely simulates pyorrhea than does any such condition produced experimentally."

Eliot, Souther, Anderson and Arnim,[57] in a study of children known to have had infantile rickets, observed a definite direct relation between hypoplastic defects of the enamel of permanent teeth and rickets but only a questionable relation between caries and rickets. Hess and Abramson[19] reported a higher incidence of caries in a small group of children who had had rickets than in a control group. On the other hand, they observed that a group of colored children who had had rickets had a lower incidence than white children with no rachitic history. Shelling and Anderson[58] found that the incidence of dental caries in the deciduous teeth of a group of children who had had rickets during infancy was not greater than that of those who had been given vitamin D and had not had rickets. Enamel hypoplasia was found oftener in the deciduous and permanent teeth of the postrachitic group. They concluded that their findings did not indicate a protective effect of vitamin D against caries in deciduous teeth or a relation between rickets and dental caries or between hypoplasia and caries. Taylor and Day[59] found that children born of mothers with osteomalacia and reared on diets deficient in calcium and phosphorus and with a past history of infantile rickets had teeth with little or no hypoplasia or caries. However, Toverud and Toverud[16] and Wolfe[24] have shown that gross hypoplasia of deciduous teeth may occur in such children. Hjärne[60] reported a high incidence of hypoplasia in children who had had infantile tetany. Rony[38] has suggested that the

presence of hypoplasia following rickets depends on the persistence of a low serum calcium concentration at some time during the period of tooth development. Hess and Abramson[19] expressed a similar opinion. Experience at the Children's Hospital with a group of children suffering from resistant rickets suggests a correlation between the degree of hypoplasia and caries and the past history of tetany and poor skeletal mineralization during the period of tooth maturation. Similarly, a child who, following the removal of a large section of small intestine, suffered from the age of two to six years with diarrhea, poor skeletal mineralization and tetany had marked hypoplasia and caries. Albright and Strock's[34] observation that the hypocalcemia of children with hyperparathyroidism affected the calcification of teeth indicates that in the absence of osteoporosis a low serum calcium concentration may result in faulty development of teeth. Because studies of teeth in hypoparathyroid tetany have dealt with patients older than those with infantile tetany, involvement of the crowns of the teeth to any great extent has not been noted.

* * *

Thus, in spite of the persistence of contradictions concerning the cause and control of dental caries in man, the experimental evidence and the clinical findings suggest the following:

Dietary deficiencies at the period when teeth are being laid down may cause hypoplastic defects in infancy and childhood that persist thereafter. The slow growth and prolonged period of calcification of human teeth renders them less susceptible to periodic deficiencies and metabolic disturbances than the rapidly growing teeth of experimental animals. Static, fully developed human teeth are practically immune to demineralization, whereas the constantly growing teeth of animals remain vulnerable to metabolic defects. Much of the contradiction in the literature on dental caries in man derives from unwarranted deductions from animal experiments and from the fact that many studies on man have involved experiments that, in the light of present knowledge, could hardly yield other than inconclusive results. The relation between enamel hypoplasia and dentinal caries needs further definition. No specific dietary factor or metabolic condition has been proved to cause or control dental caries in the fully developed human tooth.

References

1. Hanke, M. T. The role of diet in the cause, prevention and cure of dental diseases. *J. Nutrition* **3**:433-451, 1931.
2. Howe, P. R., White, R. L., and Rabine, M. Retardation of dental caries in outpatients of a dental infirmary. *Am. J. Dis. Child.* **46**:1045-1049, 1933.
3. Zilva, S. S., and Wells, F. M. Changes in the teeth of the guinea-pig produced by a scorbutic diet. *Proc. Roy. Soc., London*, Series B. **90**:505-512, 1919.
4. Howe, P. R. The effect of scorbutic diets upon teeth. *Dental Cosmos* **62**:586-590, 1920. Dental caries. *Ibid.* **62**:921-929, 1920.
5. McCollum, E. V., Simmonds, N., Parsons, H. T., Shipley, P. G., and Park, E. A. Studies on experimental rickets. I. The production of rachitis and similar diseases in the rat by deficient diets. *J. Biol. Chem.* **45**:333-342, 1921.
6. *Idem*: Studies on experimental rickets. II. The effect of cod liver oil administered to rats with experimental rickets. *J. Biol. Chem.* **45**:343-348, 1921.
7. Höjer, J. A. Studies in scurvy. *Acta paediat.* (Supp.) **3**:1-278, 1924.
8. Wolbach, S. B., and Howe, P. R. Tissue changes following deprivation of fat-soluble A vitamin. *J. Exper. Med.* **42**:753-777, 1925. Intracellular substances in experimental scorbutus. *Arch. Path.* **1**:1-24, 1926. Vitamin A deficiency in the guinea pig. *Ibid.* **5**:239-253, 1928.
9. Mellanby, M. The influence of diet on the structure of teeth. *Physiol. Rev.* **8**:545-557, 1928. Diet and the teeth: an experimental study. *Report of the Medical Research Council.* No. 140. 308 pp. London: His Majesty's Stationery Office, 1929.
10. Boyle, P. E. The effect of ascorbic acid deficiency on enamel formation in the teeth of guinea-pigs. *Am. J. Path.* **14**:843-848, 1938.
11. Boyle, P. E., and Bessey, O. Dental caries in the guinea pig. *J. Dent. Research* **17**:325, 1938.
12. Boyle, P. E., Bessey, O., and Howe, P. R. Rate of dentin formation in incisor teeth of guinea pigs on normal and on ascorbic acid-deficient diets. *Arch. Path.* **30**:90-107, 1940.
13. Advisory Committee on Research in Dental Caries: *Denial Caries: Findings and conclusions on its causes and control.* Compiled for the Research Commission of the American Dental Association. 189 pp. Lancaster: Lancaster Press, 1939.
14. Fleisch, L. M. Relation of nutrition to dental caries. *J. Am. Dent. A.* **27**:550-554, 1940.
15. Mellanby, M. The role of nutrition as a factor in resistance to dental caries. *Brit. Dent. J.* **62**:241-252, 1937.
16. Toverud, K. U., and Toverud, G. Studies on the mineral metabolism during pregnancy and lactation and its bearing on the disposition to rickets and dental caries. *Acta paediat.* (Supp.) **12**:1-116, 1932.
17. Rosebury, T., and Foley, G. Studies in the rat of susceptibility to dental caries. II. The effect on mothers and young of diets deficient in calcium and vitamin D during pregnancy, lactation and rearing. *J. Dent. Research* **12**:462-464, 1932.
18. Young, M. The role of nutrition as a factor in resistance to dental caries. *Brit. Dent. J.* **62**:252-259, 1937.
19. Hess, A. F., and Abramson, H. The etiology of dental caries. *Dental Cosmos* **73**:849-866, 1931.
20. Fish, E. W. The aetiology of dental caries. *Brit. M. J.* **2**:747-749, 1932.
21. Boyd, J. D. The role of diet in the control of dental caries. *J. Am. Dent. A.* **27**:750-756, 1940.
22. Hess, A. F., Lewis, J. M., and Roman, B. A radiographic study of calcification of the teeth from birth to adolescence. *Dental Cosmos* **74**:1053-1061, 1932.
23. Kronfeld, R., and Schour, I. Neonatal dental hypoplasia. *J. Am. Dent. A.* **26**:18-32, 1939.
24. Wolfe, J. J. Teeth in fetal rickets. *Am. J. Dis. Child.* **49**:905-911, 1935.
25. Albright, F. Hyperparathyroidism: its diagnosis and exclusion. *New Eng. J. Med.* **209**:476-480, 1933.
26. Albright, F., Aub, J. C., and Bauer, W. Hyperparathyroidism. *J. A. M. A.* **102**:1276-1281, 1934.
27. Stafne, E. C., and Austin, L. T. A study of dental roentgenograms in cases of Paget's disease (osteitis deformans), osteitis fibrosa cystica and osteoma. *J. Am. Dent. A.* **25**:1202-1214, 1938.
28. Strock, M. S. The mouth in hyperparathyroidism. *New Eng. J. Med.* **224**:1019-1023, 1941.
29. Vanzant, F. R., and Philips, J. R. A case of hyperparathyroidism associated with extreme dental caries. *Am. J. Surg.* **50**:130, 1940.
30. Maxwell, J. P., and Miles, L. M. Osteomalacia in China. *China M. J.* **37**:625-642, 1923.
31. Taylor, G. F., and Day, C. D. M. Osteomalacia and dental caries. *Brit. M. J.* **1**:221, 1940.
32. Smyth, F. S., and Goldman, L. Renal rickets with metastatic calcification and parathyroid dysfunction. *Am. J. Dis. Child.* **48**:596-618, 1934.
33. Erdheim, J. Tetania parathyreopriva. *Mitt. a. d. Grenzgeb. d. Med. u. Chir.* **16**:632-744, 1906. Zur Kenntnis der parathyreopriva Dentin-Veranderung. *Frankfurt. Ztschr. f. Path.* **7**:238-248, 1911.
34. Albright, F., and Strock, M. S. Association of acalcification of dentin with hypoparathyroidism in rat and cure of same with parathormone with some correlated observations in man. *J. Clin. Investigation* **12**:974, 1933.
35. Schour, I., Chandler, S. B., Tweedy, W. R., and Engel, M. B. Changes in teeth following parathyroidectomy. I. The effects of different periods of survival, fasting and repeated pregnancies and lactations on the incisor of the rat. II. The effect of parathyroid extract and calciferol on the incisor of the rat. *Am. J. Path.* **13**:945-984, 1937.
36. Ziskin, D. E., Applebaum, E., and Salmon, F. N. Effect on skeletal and dental development of rats thyro-parathyroidectomized at birth. *J. Dent. Research* **18**:251, 1939.
37. Ziskin, D. E., and Applebaum, E. The effects of thyroidectomy and thyroid stimulation of growing permanent dentition of rhesus monkeys. *J. Dent. Research* **20**:21-27, 1941.
38. Rony, H. R. Endocrine glands and dentistry. *J. Am. Dent. A.* **21**:1651-1659, 1934.
39. Fox, L. Paget's disease (osteitis deformans) and its effect on maxillary bones and teeth. *J. Am. Dent. A.* **20**:1823-1829, 1933.
40. Seldin, N. A. Paget's disease: a clinical case. *Dental Cosmos* **75**:691, 1933.

41. Cahn, L. R. Paget's disease of bone. *Arch. Clin. & Oral Path.* **1**:141, 1937.
42. Eaton, H. M. Oral conditions during pregnancy. *J. Dental Research* **15**:215, 1935.
43. Ziskin, D. E., and Hotelling, H. Effects of pregnancy, mouth acidity and age on dental caries. *J. Dent. Research* **16**:507-519, 1937.
44. Weisberger, D.: personal communication.
45. Ziskin, D. E., Blackberg, S. N., and Stout, A. P. The ginginvae during pregnancy. *Surg., Gynec. & Obst.* **57**:719-726, 1933.
46. Ziskin, D. E. The effect of hormonal treatment on the gums and oral mucosa of women, with use of estrogen; with use of gonadotropic hormone of pregnancy urine. *J. Dent. Research* **16**:367-378, 1937.
47. *Idem*: Hormonal therapy for some gingival conditions. *J. Dent. Research* **18**:329-341, 1939.
48. Bloch, C. E. Effects of deficiency in vitamins in infancy. *Am. J. Dis. Child.* **42**:263-278, 1931.
49. Boyle, P. E. Manifestations of vitamin A deficiency in a human tooth-germ. *J. Dent. Research* **13**:39-50, 1933.
50. Westin, G. Scorbutic changes in the teeth and jaws of man. *Dental Cosmos* **67**:868-872, 1925.
51. Boyle, P. E. The tooth germ in acute scurvy. *J. Dent. Research* **14**:172, 1934.
52. Aschoff, L., and Koch, W. *Skorbut: Eine pathologisch-anatomische Studie.* 122 pp. Jena: Gustav Fischer, 1919.
53. Westin, G. *Ueber Zahnveränderungen in Fällen von Skorbut bei Homo.* 2 vol. 997 pp. Stockholm: A.-B. Fahlcrants, 1931.
54. Crandon, J. H., Lund, C. C., and Dill, D. B. Experimental human scurvy. *New Eng. J. Med.* **223**:353-369, 1940.
55. Boyle, P. E., Bessey, O., and Wolbach, S. B. Experimental production of the diffuse alveolar bone atrophy type of peridontal disease by diets deficient in ascorbic acid (vitamin C). *J. Am. Dent. A.* **24**:1768-1777, 1937.
56. Gottlieb, B. Tissue changes in pyorrhea. *J. Am. Dent. A.* **14**:2178-2207, 1927.
57. Eliot, M. M., Souther, S. P., Anderson, B. A., and Arnim, S. A study of teeth of a group of school children previously examined for rickets. *Am. J. Dis. Child.* **46**:458-461, 1933.
58. Shelling, D. H., and Anderson, G. M. Relation of rickets and vitamin D to the incidence of dental caries, enamel hypoplasia and malocclusion in children. *J. Am. Dent. A.* **23**:840-846, 1936.
59. Taylor, G. F., and Day, C. D. M. The relation of vitamin D and mineral deficiencies to dental caries. *Brit. M. J.* **1**:919-921, 1939.
60. Hjärne, U. Beitrag zur Kenntnis der Prognose der spasmophilen Kinder. *Acta paediat.* **10**:281-301, 1931.

CASE RECORDS OF THE MASSACHUSETTS GENERAL HOSPITAL

ANTE-MORTEM AND POST-MORTEM RECORDS AS USED IN WEEKLY CLINICOPATHOLOGICAL EXERCISES

FOUNDED BY RICHARD C. CABOT

TRACY B. MALLORY, M.D., *Editor*

CASE 27451

PRESENTATION OF CASE

A sixty-eight-year-old housewife was admitted to the hospital because of vomiting and diarrhea.

She was apparently in good health until about seven weeks before entry, when she was seized with cramping pains in the left lower abdomen, associated with distention. After a short time, she began to have from six to eight watery, mucoid, blood-free stools a day. She also had spells of vomiting, always preceded by nausea. The vomitus was copious, fluid, green and free of blood. The combined attacks of abdominal cramps, diarrhea, distention, nausea and vomiting tended to be intermittent, with periods of constipation and freedom from pain, nausea and vomiting. After several weeks, there appeared a constant, gnawing pain in the left upper quadrant of the abdomen, which was relieved by morphine given by a local physician. According to the patient, this medication precipitated headaches and visual disturbances, which accompanied her acute episodes of cramps and vomiting. Her appetite became poor, and during the illness she lost about 45 pounds in weight. She became progressively weaker, until she was unable to walk across a room without support. In addition, there was a feeling that food would occasionally stick in her throat, approximately at the level of the junction of neck and chest. There was also cough, productive of yellow, mucopurulent sputum. At no time in the illness was there chest pain, hemoptysis or jaundice. Two weeks before entry, a physician removed a rectal polyp.

The patient had long experienced nocturia. Four years before her last illness, she felt weak and was treated medically in a local hospital, with a diagnosis of "Bright's disease." The family history was not significant.

Two days before admission, the patient entered another hospital, where she was found to be chronically ill and wasted. The eyes were sunken, and there was a scaling, red eruption over the nose and malar prominences. The skin was generally loose and flabby, and there was pitting edema over the sacrum and in both ankles. There was a small nodule in the thyroid gland, both lobes of which were palpable. The chest showed increased resonance and fremitus over the right apex posteriorly, with many coarse rales in this area, and a few scattered rales over both bases. The heart was not remarkable. The spleen and liver were not palpable. There was some fullness over the lower abdomen, with an irregular mass in the suprapubic region, extending to the left lower quadrant, where there was local tenderness. The mass was palpable rectally, but there were no nodules within the rectum itself, and sigmoidoscopic examination was negative. On pelvic examination, the entire pelvis felt "frozen," and the uterus seemed connected with the suprapubic mass. The vagina was atrophic, admitting but one finger. The superficial lymph nodes were palpable. The blood pressure was 120 systolic, 80 diastolic.

The temperature was 98.6°F., the pulse 104, and the respirations 24.

Examination of the blood showed a red-cell count of 4,860,000 with 92 per cent hemoglobin, and a white-cell count of 13,750 with 72 per cent mature polymorphonuclears, 6.5 per cent band cells, 2 per cent eosinophils, 0.5 per cent basophils, 8.5 per cent monocytes and 5.5 per cent myelocytes. The serum albumin was 2.8 gm. and the serum globulin 2.6 gm. per 100 cc. The chlorides were 91.8 milliequiv. per liter. The nonprotein nitrogen was 54 mg. per 100 cc. The blood Hinton, Wassermann and Kahn reactions were negative.

The urine showed a ++ test for albumin and a + test for urobilinogen (no urobilin), and the sediment included large round cells, hyaline and granular casts, and 25 to 50 white cells per high-power field.

Stool examination showed positive guaiac and benzidine reactions. Gastric analysis showed 60 units of free acid following histamine. The stomach contents were free of acid-fast bacilli.

A roentgenogram of the chest showed diffuse mottling, most marked at the right base and in the right upper lobe. A flat roentgenogram of the abdomen showed numerous gas-filled loops having the pattern of small intestines. A barium enema passed through the rectum into a slightly elongated sigmoidal loop, the proximal portion of which was definitely narrowed over a distance of 8 cm. adjoining the junction of the sigmoid and descending colon. The contour of the stenosis could not be made out in any detail because of technical difficulties.

While in the other hospital, the patient ran a fever up to 101°F. rectally. Following an unsuccessful attempt to pass a Miller-Abbott tube, she was placed on Wangensteen drainage, and was

given intravenous glucose and salt solution. On the fifth day after admission, she was transferred to this hospital for operation.

Examination at this time was essentially as before. There were no significant changes in laboratory studies except for a rise in the white-cell count to 21,100 with 81 per cent polymorphonuclears. Roentgenologic studies were as before, with the additional findings of generalized decalcification of the skeleton, the fracture of a mid-dorsal vertebra and small amounts of fluid in both pleural cavities.

The patient was considered too poor a risk for operative intervention. She was continued on the Miller-Abbott tube. On the sixth hospital day, her temperature rose to 101°F., and she rapidly became weaker. Death occurred eight days after admission.

Differential Diagnosis

Dr. Arthur W. Allen: Are the x-ray films here?

Dr. James R. Lingley: This is evidently the area of narrowing referred to in the sigmoid. The small bowel contains much gas and is moderately dilated, but there is surprisingly little dilatation of the colon above the point of partial obstruction. The chest shows fluid in both pleural cavities and a process in the right upper lobe, the nature of which is not definite from the one film available. It could be an acute pneumonia or a chronic tuberculous infection.

Dr. Allen: The films add nothing to the report. We do see distended loops of small bowel, which means that whatever the cause, the patient had intestinal obstruction. If we are to believe this story as it is written, this woman was in comparatively good health until a short time prior to her death. The seven weeks' duration prior to entry and the eight days here in the hospital give her a total illness of less than two months. We are told that during this time she lost 45 pounds in weight, a clear indication that during her present illness she could not have absorbed much nourishment.

The conditions that could produce such a picture as this are numerous. One has to think first of all of some kind of acute inflammatory process as an origin of her difficulty. The possibility of appendicitis has to be considered because that could produce a picture not too different from this, with a final mass in the pelvis, with some fixation of the pelvic organs, subsequent obstruction, which might be intermittent, and finally death. Diverticulitis arising from the sigmoid could be another inflammatory cause for such a picture, but I believe that one would see diverticulums in the sigmoid if that had to be seriously considered. The question of Meckel's diverticulum has to be borne in mind, but it is not so commonly met in people of this age as in younger patients. Most of the cases of Meckel's diverticulum that have been operated on in this hospital in adults have had a preoperative diagnosis of intestinal obstruction, with a fairly long history of illness.

Then we come to the other group of diseases that must be seriously considered in a patient of this age, regardless of her well-being prior to this present illness — namely, some form of malignant neoplasm. Many facts associated with this particular history and physical examination point toward neoplasia. It is perfectly possible to have had a slowly developing malignant tumor that might quite suddenly produce intestinal obstruction. The fact that the point of intestinal obstruction did not appear actually to be in this narrow sigmoid but somewhere in the small bowel does not mean that the primary disease could not have arisen from this region. The fact that a rectal polyp had been removed two weeks prior to entry makes us seriously consider the possibility of carcinoma of the rectosigmoid, perhaps developing from a polyp, which had worked its way through the bowel wall and produced a mass such as that described. One very significant point is against this possibility: the record states quite clearly that the stools were grossly blood free. They did find a positive benzidine and guaiac test in the laboratory, but carcinoma of the colon arising from a polyp will nearly always produce gross blood. That is a point we have to take into consideration in the differential diagnosis of this particular patient. Another possibility is an ovarian carcinoma that had remained localized for quite a long time and then got out of bounds, producing pressure on the sigmoid or, more likely, a loop of small bowel becoming adherent to the ovarian tumor. The story is quite compatible with such a condition. The spontaneous fracture of the dorsal vertebra is not clear to me; whether it is there or not, I cannot tell.

Dr. Lingley: I do not see it on these films.

Dr. Allen: If present, it would make one think of widespread metastases to the bones, which do rarely occur with cancer of the bowel and a little more often with cancer of the ovary, but are much less common in these two forms of malignant disease than they are with carcinoma of the breast or prostate. The marked decalcification bothers me a little, although I think we see that not infrequently in elderly people. There is noth-

ing about the laboratory findings that would indicate to me that this decalcification was on any other than a senile basis.

The patient was in a terrific state of malnutrition, and I assume that the low serum protein, low chlorides, high nonprotein nitrogen, peripheral edema and, probably, the scaly eruption over the nose and malar regions were significant of a severe deficiency state. That, of course, could be secondary to any situation producing the obstruction with which we are dealing.

Many rare situations naturally occur to us as possibilities. Did the patient have widespread tuberculosis? I do not know whether the changes in the lungs mean tuberculosis, and Dr. Lingley is not willing to tell me. I suppose that it probably was not tuberculosis. The fact that the stomach contents were tested for acid-fast bacilli means that at least they had that in mind. A widespread tuberculosis with tuberculous peritonitis could very well account for the abdominal picture. I should be very much surprised, however, if it turned out to be that. I should be inclined to put it about my third choice.

Then, there are other conditions. Attention is drawn to a nodule in the region of the thyroid gland. I wonder whether the decalcification could by any chance be associated with a hyperparathyroidism, but even if she had that I think it would not account for the abdominal situation, nor do I believe her primary difficulty was carcinoma of the thyroid gland.

We must consider the question of hypernephroma with spontaneous fractures, but I think the fact that there was no blood microscopically in the urine is against this possibility. The question of widespread lymphoma must also be considered, but I should have expected a more gradual onset of difficulty in that event.

In summary, I believe that this woman's primary condition was due to malignant neoplasm, that the origin was probably in the pelvis,—that is, the ovary rather than the bowel,—and that her general decline was on that basis rather than on any other.

DR. TRACY B. MALLORY: The clinical diagnoses from the wards were subacute intestinal obstruction, a question of malignancy and of peritonitis. They evidently did not commit themselves so far as you did, Dr. Allen.

CLINICAL DIAGNOSES

Subacute intestinal obstruction.
Carcinomatosis?
Peritonitis?

DR. ALLEN'S DIAGNOSIS

Intestinal obstruction (small bowel), secondary to carcinoma of the ovary.

ANATOMICAL DIAGNOSES

Reticulum-cell sarcoma, involving sigmoid, left ovary, omentum, lungs, pleura and kidneys.
Intestinal obstruction.
Ascites.
Hydrothorax, bilateral.

PATHOLOGICAL DISCUSSION

DR. MALLORY: At post-mortem examination, a large tumor mass was found in the left lower quadrant, involving the sigmoid, the ovary and the cornu of the uterus, to which two loops of small bowel had become adherent, and secondarily invaded by the neoplasm. The obstruction was evidently due chiefly to kinking of the small bowel at the point of adhesion to the tumor mass. The large bowel was infiltrated over a distance of 8 to 10 cm.; its walls were diffusely thickened, suggestive of a rubber hose. On further dissection, it was found that in the midst of this mass was a normal ovary. Microscopic sections proved eventually that this tumor belonged in the lymphoma group and was of the type usually called reticulum-cell sarcoma. There were practically no enlarged lymph nodes throughout the body. The spleen and liver were normal in size. There was an unusual feature consisting of very numerous pleural plaques of tumor. The majority of the small areas seen in the x-ray film are probably pleural plaques. There was also, however, some infiltration of the lung itself, although relatively slight in proportion to the pleural involvement. Both kidneys contained many nodules of tumor. We did not find the fractured vertebra at autopsy.

DR. ALLEN: Where did the tumor originate—in the bowel or in the ovary?

DR. MALLORY: I think it must have originated in the bowel and secondarily involved the ovary. The latter was not invaded; it was merely surrounded by tumor.

DR. ALLEN: Were there any more polyps in the colon?

DR. MALLORY: None were noted.

A PHYSICIAN: Was there any fluid in the chest?

DR. MALLORY: There was 1000 cc. in the right pleural cavity. Whether that was there when the picture was taken, I do not know, since it is never possible on anatomic grounds to tell how long chest fluid has been present.

CASE 27452

Presentation of Case

A sixty-year-old man was admitted to the hospital because of lower abdominal pain.

He had always been in fairly good health, except for a chronic "bronchitis," gradually increasing deafness extending over a period of many years and an old "rupture." This hernia had been present for a long time in the right inguinal region and had always been reducible, although occasionally with some difficulty. A truss had been worn, and had given good support.

Three days before entry, the patient noticed slight discomfort in his lower abdomen near the hernia, characterized by a feeling of "gas." He paid little attention to his condition at that time, but the next day, when actual pain appeared (localized in the region of the hernia and extending across the lower abdomen), he took a dose of soda bicarbonate and Epsom salts. Following this, his pain increased. Only a scanty bowel movement was produced; the stool contained no blood. During the day, the patient experienced a questionable chill. There was no nausea or vomiting. Late in the third day, he called a physician because his pain had become too great to bear. He was given morphine, and referred to the hospital.

On examination, the patient appeared well controlled by sedation. He was an obese man, with some cough and with wheezing respirations. Loud, coarse rhonchi were heard throughout both lung fields, without other signs. The heart was slightly enlarged toward the left. The abdomen was quite obese. Tenderness and spasm were present in both lower quadrants, especially in the left, where there was some question of a palpable mass. Peristalsis was active. Two hernias were present, one at the umbilicus about 4 cm. in diameter and one extending across the right inguinal region to the scrotum about 12 cm. in diameter. Both were reducible. Slight scrotal edema was present. The blood pressure was 120 systolic, 75 diastolic.

The temperature was 102°F., the pulse was 120 and the respirations were 24.

Examination of the blood showed a white-cell count of 20,400 with 90 per cent polymorphonuclears, and a red-cell count of 4,240,000 with 9.8 gm. hemoglobin. The blood Hinton reaction was negative. The urine showed a ++ test for albumin, with occasional granular casts and white cells in the sediment.

The patient was at once started on sulfapyridine, and a blood level of 3 to 4 mg. per 100 cc. was maintained. A Miller–Abbott tube was passed. The temperature dropped to 99°F. in three days, and there was definite improvement in his condition. A roentgenogram of the abdomen, taken on the second hospital day, showed a large amount of gas in the stomach and in at least two loops of the small bowel. The tip of the Miller–Abbott tube lay in the pylorus. An ovoid area of increased density, suggesting a stone, was present in the region of the gall bladder.

The extremities became cold and sweaty, and the pulse and temperature rose sharply to 160 and 103°F., respectively. The patient thrashed about in bed, complaining bitterly of lower abdominal pain and voiding incontinently. His abdomen was more distended and firmer than it had been heretofore; peristalsis was absent. The patient was finally brought under sedation. In the next two days, there was again considerable improvement in his condition, with a corresponding fall in the temperature and pulse. On the eleventh hospital day, following blood transfusion, the lower abdomen was opened under local anesthesia, by an incision splitting the right rectus muscle. The omentum was found adherent in the pelvis, covering a pocket of pus. Several similar pockets lying between loops of the small intestine were also evacuated. A Witzel enterostomy was made in the left lower quadrant, and the wound closed with drainage. The following day (thirteenth hospital day) respirations became increasingly stertorous and failed.

Differential Diagnosis

Dr. Champ Lyons: This patient had a hernia for many years that gave no trouble and was easily reducible. Apparently, it was well controlled by a truss. He entered the hospital after three days of lower abdominal pain, which I interpret as gas pains, although there is no definite statement of their character in the record. Such a lower abdominal crampy pain suggests large-bowel obstruction. Two days before entry, the patient took a purgative, which failed to give complete evacuation of the large bowel and increased the pain. I again believe that signifies some degree of large-bowel obstruction. The suggestive chill, the elevation of temperature and the white-cell count consistent with suppurative inflammation all make me think that the large-bowel obstruction was associated with some pelvic inflammation. It is significant that there had been no nausea or vomiting such as would be more likely to occur with small-bowel than with large-bowel obstruction. The pain was so severe as to require morphine; this also suggests a peristaltic type of pain.

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May we see the x-ray films? I should particularly like to have Dr. Lingley point out the

gas in the large and small bowel and discuss its significance.

DR. JAMES R. LINGLEY: Here is the large area of calcification in the region of the gall bladder. It is quite characteristic of and undoubtedly is a stone. Here is the loop of dilated intestine that is described. It is often very difficult by x-ray study to determine whether such a loop is colon or small bowel, particularly when there is marked dilatation. In this case, I think you can see evidence of the valvulae conniventes of the jejunum rather than the haustral markings of the colon. I should be inclined to think it was small rather than large bowel, even though it is in the region of the transverse colon. No definite masses are visible, although these films were taken with a portable machine and therefore are not of very good quality.

DR. LYONS: The physical examination of the abdomen was of particular interest. There is no note of whether or not the abdomen was distended. The record simply says it was obese. The patient had active peristalsis, again a suggestion of intestinal obstruction rather than a distention of the bowel from ileus or peritonitis. The evidence of inflammation is confined chiefly to the lower abdomen, where there were tenderness and spasm and a questionable mass on the left side. The hernia was still reducible, and evidently there was no incarceration or strangulation. Scrotal edema without edema elsewhere in a man up and about again suggests to me an inflammatory infiltrative process rather than edema on the basis of cardiac failure or low serum protein. The single urine report of a ++ test for albumin, with casts, is inadequate for evaluation of the kidney function. The patient had inflammation and fever on entry, and it might be the albuminuria of the febrile reaction. No blood chemical findings were reported. The failure of the Miller–Abbott tube to pass does not disturb me because it often fails to pass in sick patients. They cannot be taken down to the X-ray Department, where one can manipulate the tube. The gallstone was in the usual position. I rather think we need not consider gallstone ileus because of the lack of symptoms of upper intestinal obstruction. The temperature dropped to 99°F. under bed rest, a consequence presumably of sulfapyridine therapy, which suggests a slow subsidence of the intra-abdominal infection. The acute collapse on the third day of hospitalization is to my mind associated with acute rupture of an abscess or of bowel, with a spread of this inflammatory process in the abdomen. From then on, the symptoms are those of peritonitis. The operative interference apparently did not add much diagnostic information, and enterostomy was done, with decompression of the small bowel.

I shall confine my discussion to those diseases that I think might result in obstruction in the large bowel or arise from inflammation in the region of the large bowel.

Appendicitis with abscess formation one should consider foremost and primarily, but there was too little evidence of associated small-bowel obstruction to make appendicitis a likely possibility. In appendiceal inflammation, obstruction is much more apt to involve small bowel than large bowel. There is too little in the way of a mass to account for the acute illness. Had this been an appendicitis progressing to abscess formation making him as sick as he was, I should think that the patient would have had more of a mass in the abdomen. If this had been acute rupture of an appendix, the symptoms would have been those of peritonitis rather than of large-bowel obstruction.

Carcinoma with secondary perforation must be seriously considered. The lesions of the rectosigmoid are much more apt to give obstruction than to perforate. Perforation of neoplasms of the colon occurs most frequently in lesions above the rectosigmoid.

To my mind, the best diagnosis is diverticulitis. I am a little disturbed about that diagnosis because there was not a sufficient history of previous difficulty. There was no blood in the stool, which might suggest that diverticulitis and carcinoma coexisted. On the other hand, the story of lower abdominal inflammation, with subsequent perforation, does stand out. We must also consider obstruction. Inflammatory diverticulitis may obstruct, but this was rather an acute obstruction for the slowly developing inflammation of a diverticulitis and it is unusual for simple diverticulitis to give generalized peritonitis. Fish-bone or chicken-bone perforation of the diverticulum can produce such a peritonitis, but we have no evidence that that occurred. I believe that this man had diverticulosis for a considerable time, that he then developed large-bowel obstruction distal to the diverticulosis, and that diverticulitis followed as a consequence of this obstruction.

My final diagnoses include umbilical and scrotal hernia, cholelithiasis and diffuse peritonitis, which I believe was the primary cause of death. I think he had diverticulitis with abscess formation and subsequent rupture of the abscess, and I rather suspect there was an obstructing rectosigmoid carcinoma.

DR. ROBERT LINTON: When the record says that the patient was quite obese it is much to the point.

He was so obese that one could not tell whether he was distended or not. He was extremely difficult to handle. When I first saw him, the pain was entirely in the scrotal hernia on the right side. It stayed there for a day and then shifted to the left lower quadrant and subsequently shifted back to the right lower quadrant. The differential diagnosis while the patient was in the hospital lay between appendicitis and diverticulitis, with rupture of either one of them, and as time elapsed the diagnosis seemed to become more obvious. We thought he had diverticulitis, with rupture and abscess formation. The patient was never in any condition to make it possible to perform a laparotomy to relieve him of his trouble. The enterostomy that was made just before death was done chiefly because the Miller–Abbott tube could not be passed, and it was thought that decompression of the small bowel might help him, although little hope of saving him was entertained at that time. The clinical diagnosis, I think, on the record was diverticulitis, with abscess formation and peritonitis.

Clinical Diagnoses

Acute diverticulitis with rupture.
Acute peritonitis.
Bronchopneumonia.

Dr. Lyons's Diagnoses

Diverticulitis, with abscess formation and rupture.
Rectosigmoid carcinoma?
General peritonitis.
Umbilical and inguinal hernias.
Cholelithiasis.

Anatomical Diagnoses

Carcinoma of sigmoid.
Perforation of sigmoid.
General peritonitis, acute.
Diverticulosis of colon.
Polyps of sigmoid.
Umbilical hernia.
Inguinal hernia, right.
Operative wound: ileostomy.

Pathological Discussion

Dr. Tracy B. Mallory: This patient had diverticulosis of the colon, polyps and carcinoma. The carcinoma was an annular affair, which produced very severe obstruction. We found a perforation of the bowel 13 or 14 cm. back from the cancer. It appeared to be a spontaneous rupture of the intestine, possibly at the site of a diverticulum, although we could not determine that with any certainty. There was no local inflammatory process, although, of course, there was a generalized peritonitis. We could not make out evidence of successive stages of peritoneal inflammation. There was a very large gallstone, but nothing else of clinical significance.

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THE JOURNAL does not hold itself responsible for statements made by any contributor.

COMMUNICATIONS should be addressed to the *New England Journal of Medicine*, 8 Fenway, Boston, Massachusetts.

MASSACHUSETTS MEDICAL SERVICE CORPORATION

BY far the most important report presented at the October meeting of the Council of the Massachusetts Medical Society was that of the special committee of the Committee on Public Relations that was appointed to study the problem of prepaid medical-care costs insurance. Through the efforts of the special committee, an enabling act to permit the formation of a corporation to issue this type of insurance was passed by the Legislature and signed by the Governor last May, and the current report covers the recommendations of the committee in regard to by-laws governing the organization of such a corporation.

The report was ably presented by the chairman of the special committee, Dr. James C. McCann, of Worcester, and his remarks appear elsewhere in this issue of the *Journal*. The fact that the tentative by-laws and the report were accepted by the Council without discussion is indicative of the care that the committee had exercised to devise a setup that would be acceptable to the members of the Massachusetts Medical Society.

As Dr. McCann emphasized, the scheme is of vital significance to the physicians of Massachusetts, since it transfers supervision of a certain amount — perhaps a large part — of the practice of medicine to a corporation; hence, the control of this corporation should be in the hands of the medical profession. Suitable control appears to be provided by the proposed by-laws, but the committee requests suggestions concerning changes, additions and deletions that can be incorporated in the final set. Every member of the Massachusetts Medical Society should carefully read the report and study the tentative by-laws (printed in the September 18 issue of the *Journal*), bearing in mind the committee's request.

AMERICAN RED CROSS

THE efforts of the American Red Cross, which have achieved so much in the years of peace, must, like every other endeavor, be adjusted to meet the demands of national defense. Accordingly, the forthcoming membership roll call will be the most important in two decades. With the advice and approval of the Medical and Health Advisory Committee, consisting of leading representatives of the medical profession, the Red Cross has extended its policies to include new phases of civilian and military welfare created by the national emergency.

An efficient defense program is contingent not only on an expertly trained and able-bodied army, navy and air corps, but also on a healthy industrial population to produce the necessary arms for these forces: sufficient nourishment and protection against accidents are no less vital than surgical dressings, blood for transfusion, and antiseptics. Thus, in addition to education in accident prevention, first aid and nutrition, public-

health and other types of nursing service, medical relief in disaster and its enormous campaign against tuberculosis, the Red Cross must be prepared to meet problems incident to national defense.

Because of its organization into chapters that cover every part of the United States, the American Red Cross is in a position to transform its national policies into local action directed from one responsible center. Thousands of volunteers can be put to work, almost at a moment's notice, making surgical dressings for the armed forces; if it becomes necessary to increase output, additional chapters can be called into this work. Furthermore, wherever facilities for the processing of blood plasma exist, chapters can enroll volunteer donors to build up the blood bank that is now being established for the use of the medical authorities of the United States Army and Navy.

To fulfill these numerous purposes, the Red Cross must have the fullest co-operation of both the medical profession and the lay public. Every physician is urged to join his local chapter during the membership roll call, from November 11 through November 30; he will thus reaffirm his faith in the humanitarian principles and splendid achievements of the American Red Cross, and he will also contribute indispensable help to the defense of the Nation in a time of emergency.

MEDICAL EPONYM

Krukenberg Tumor

Friedrich Krukenberg, of Marburg, Germany, described the so-called "fibrosarcoma ovarii mucocellulare (carcinomatodes)" in the *Archiv für Gynaekologie* (50: 287–321, 1896). A portion of the translation follows:

> The above-described tumors, which had been diagnosed as fibrosarcoma, myxosarcoma and, particularly, fibrous carcinoma, are examples of a fairly well-defined form of solid ovarian tumor, which has the following characteristics:
>
> The new growth is apparently always bilateral, may occur in young people as well as in those of more advanced age, and seems to grow slowly. As a rule, there is concomitant ascites.
>
> It leads to enlargement of the whole ovary, without alteration in its form, although the surface becomes more or less lumpy in appearance.
>
> The histologic structure of the tumor mass shows certain variations that may, in extreme cases, lead to quite atypical pictures. The firm portions occur as the result of marked overgrowth of the spindle-shaped cells of the ovarian stroma, which take the form of a fine fibrillary meshwork with spindle-shaped or branching cells in the softer parts.
>
> In the more richly cellular portions, round, swollen cells, usually in the form of larger or smaller masses, occur. These cells are made up of a delicately vacuolated protoplasm and often contain mucus. They lie between the spindle-shaped cells of the stroma. . . . These swollen cells apparently represent the truly characteristic, specific feature of the tumor. . . .

R. W. B.

MASSACHUSETTS MEDICAL SOCIETY

SOCIETY HEADQUARTERS

Owing to the recent pronouncement to the effect that adequate supplies of fuel oil will be available on the Eastern Seaboard this winter, the Boston Medical Library has decided to reopen on Saturdays; hence the headquarters of the Society and the office of the Journal will be open on Saturdays from 9:00 a.m. to noon.

SECTION OF OBSTETRICS AND GYNECOLOGY*

Rupture in Tubal Pregnancy, Followed by Fatal Peritonitis

A twenty-year-old primipara, when about two months pregnant, consulted a physician because of pain in the abdomen and vomiting.

The past history was irrelevant. The patient was a well-developed and well-nourished young woman. The record gives no evidence of a more complete examination.

The vomiting continued for four days, during which there was no fever. There was some irregular bleeding, and the question arose whether this was a ruptured ovarian follicle or a tubal pregnancy. Operation was deferred, in spite of the distention and in spite of the vomiting. After four days, the posterior cul-de-sac was opened, and much straw-colored blood-tinged fluid was obtained. The patient died of peritonitis three days after the operation.

Comment. No clinic is infallible; every physician makes mistakes. The seriousness of rupture in a tubal pregnancy should never be lost sight of by the obstetrician; irregular bleeding, pain in the abdomen, tenderness and distention all point to

*A series of selected case histories by members of the section will be published weekly. Comments and questions by subscribers are solicited and will be discussed by members of the section. Letters should be addressed to Dr. Raymond S. Titus, *Secretary*, 330 Dartmouth Street, Boston.

peritoneal involvement and, probably, rupture, and indicate laparotomy. There is no evidence in the record that a vaginal examination was made. If it had been, tenderness, if not a distinct mass, would undoubtedly have been recognized in one vault or the other, and early laparotomy would have prevented this obstetric disaster. No matter how lenient one may be in attempting to place responsibility for this particular fatality, mistaken diagnosis seems to be the only cause of death.

DEATHS

JOHNSON — ELMON R. JOHNSON, M.D., of Quincy, died October 30. He was in his seventy-first year.

Born in Hancock, Dr. Johnson received his degree from Boston University School of Medicine in 1895. He had been a member of the staff of the Quincy City Hospital. He was a fellow of the American College of Surgeons, the Massachusetts Medical Society and the American Medical Association.

He is survived by his widow, three daughters, two sons and two brothers.

LEONARD — JOHN M. LEONARD, M.D., of Fall River, died October 26. He was in his sixty-sixth year.

A native of Fall River, Dr. Leonard received his degree from the College of Physicians and Surgeons of Baltimore in 1900. He was a fellow of the Massachusetts Medical Society and the American Medical Association. He had been president of the staff of St. Anne's Hospital, Worcester, since 1937, and medical inspector of public schools for thirty-three years.

His widow, a daughter and three sons survive him.

MACDONALD — FREDERICK C. MACDONALD, M.D., of Boston, died October 27. He was in his sixty-sixth year.

Dr. MacDonald received his degree from Tufts College Medical School in 1901. He was a member of the Massachusetts Medical Society and the American Medical Association.

VICKERY — LUCIA F. VICKERY, M.D., of Jamaica Plain, died October 23. She was in her eighty-second year.

Born in Portland, Maine, Dr. Vickery received her degree from the Woman's Medical College of the New York Infirmary for Women and Children in 1892. She was a member of the Massachusetts Medical Society and the American Medical Association.

CORRESPONDENCE

POSTOPERATIVE RADIUM THERAPY

To the Editor: In the article, "Carcinoma of the Endometrium," by Dr. G. V. Smith, appearing in the October 16 issue of the *Journal*, the author concludes, "Preoperative and postoperative application of radium and x-radiation are considered valuable and probably necessary adjuncts to the best management of endometrial cancer." Experience with the vaginal application of a 100-mg. bomb of radium to the cervical area, following total or supravaginal hysterectomy, was cited. An effective dosage of at least 2400 mg. hr., and at most 6000 mg. hr. in two applications within eight weeks of each other, was given.

The purpose of this letter is to inject a strong word of caution in the use of radium against the cervical stump or the site of the removed cervix, following total hysterectomy. It must be remembered that since the uterus has been removed, the pelvic viscera,, namely, the small and large intestines, lie very close to the cervical stump or the area of the removed cervix. Hence, the intestine itself may be exposed to a large portion of the radium dosage given. This may result in various degrees of radionecrosis, manifested by diarrhea and cramps and later by intestinal obstruction due to adhesions or by perforation, peritonitis or the early development of an intestinovaginal fistula.

There is no effective way of screening the intestines when applying radium after hysterectomy, whether this be total or subtotal. This possible hazard should be kept constantly in mind. It looms large as a pitfall only in the hands of the occasional user of radium.

HOLLIS L. ALBRIGHT, M.D.

412 Beacon Street
Boston

* * *

The above letter was referred to Dr. Smith, whose reply was as follows:

To the Editor: Dr. Albright misquotes the last paragraph of my "Summary and Conclusions," which begins "Preoperative or postoperative," not "Preoperative and postoperative." Five times in the paper I refer to the use of radium before *or* after operation. We do not apply radium before and after operation, except in rare cases.

Concerning the cases covered in the review, namely, through 1935, the postoperative dosage of radium and screening are accurately described in the paragraph on *"Postoperative radiation."* The largest postoperative dose was 3000 mg. hr. In the following paragraph, I should have stated that our postoperative doses since 1935, although at least 2400 mg. hr., have never exceeded 3000 mg. hr. With the screening described, namely, 1.0 mm. of brass and 2.0 mm. of lead in addition to the 0.5-mm. silver capsule containing the radium, this dose has been found safe, as attested by the absence of complications in those so treated and carefully followed since 1935. Concerning this same paragraph, Dr. Albright makes a misstatement to the effect that a dosage of at most 6000 mg. hr. was given following hysterectomy. Actually the sentence reads, ". . . at least 2400 mg. hr. postoperatively, and two applications two to eight weeks apart, totaling 4800 to 6000 mg. hr., for those not operated on." Only patients *not* operated on receive the large doses, and these, too, are heavily screened.

At the Free Hospital for Women, where we treat approximately 150 new cases of cancer yearly and follow 300 to 400 treated cases during each year, all the possible hazards of irradiation are of necessity constantly in our minds in connection with the type and extent of the disease, the condition of the patient and operative procedures. To those of us who are using radium on an average of two to three times a week, the possible hazards loom large as pitfalls, which we must be on the alert to avoid if we can and which we often are forced to accept in situations where the likely advantages appear to outweigh the con-

ceivable disadvantages. Although we use radium often and despite our best judgment, unpredictable and unavoidable complications do develop. Therefore I take exception to Dr. Albright's statement that the possible hazard of applying radium after hysterectomy "looms large as a pitfall only in the hands of the occasional user," although we happen to have been fortunate in the results of our postoperative applications.

I heartily endorse his words of caution but point out that the lethal and disabling complications of carefully planned radiation are relatively rare and that considerable risk is warranted when one is aiming to render patients free of cancer.

GEORGE V. SMITH, M.D.

Free Hospital for Women
Brookline, Massachusetts

ACCIDENTAL MALARIAL INFECTION

* For correction, see p. 887-888

To the Editor: In a recent paper in *Venereal Disease Information* (22:271–276, 1941), concerning the technic of induced malaria used in the South Carolina State Hospital, the special point is made that patients undergoing malarial therapy should be kept isolated in a screened ward. The authors remark that some of the malarial strains examined by them and supposed to be free of gametocytes were, in fact, no different from other strains and were potentially dangerous because of the presence of these gametocytes and hence the possibility of transfer from patient to patient by certain species of mosquitoes. They also refer to reports from Europe of outbreaks of malaria because anopheline mosquitoes easily came in contact with patients undergoing malarial therapy.

It might be thought that no especial attention need be given these points in the northern part of the United States, but this is apparently not so. A superficial study of an accidentally contracted unexplained case of malaria in a Boston hospital in 1940 brought out some interesting facts. The subject was a house officer whose duties included malarial treatment. While in the hospital during the winter of 1940, he was bitten several times by mosquitoes which were not identified. Within a reasonable incubation period (four to five weeks) from the date he was bitten, he came down with tertian malaria. During that period he had injected malarial blood into several patients without known untoward accident; the last injection was given by him eleven days before he himself became ill. Fourteen days before he became ill he gave a 500-cc. transfusion to a patient who had never had malaria and who had never been outside Massachusetts; this patient did not develop malaria. Malariologists pointed out that the failure of the recipient to contract malaria probably but not certainly excluded the existence of malarial infection in the house officer at the time of the transfusion. Since the house officer was a reasonably careful worker, had no skin abrasions and recalled nothing unusual about the injections of malarial blood he had given to ward patients, the way in which he contracted malaria is not evident.

Stained slides of the blood of patients on his ward inoculated with tertian malaria were examined by parasitologists at the Harvard Medical School. Despite the fact that the strain of malaria used at this hospital had been circulated from patient to patient for some fifteen years, gametocytes were easily found on these slides. A careful search for mosquito breeding places was planned but was quite unnecessary. Within five minutes from the start of the search, a possible breeding place,—a large shallow pool (10 by 20 feet) of water about some boilers,—was found. Many adult mosquitoes were flying around in March, and the men working in the boiler room said the mosquitoes had bitten them all through the winter. Several hundred larvae from this pool and a smaller number of adult mosquitoes were examined, but all were found to belong to the Culex genus, which, of course, has never been incriminated as a carrier of malaria. A recent survey in Suffolk County revealed that anopheline mosquitoes are occasionally present there in the summertime, and it is possible that a breeding place harboring this genus might have been found if a more thorough search had been made.

In any event it is apparent that, with the presence of gametocytes in the blood of patients undergoing malarial therapy, extreme care should be taken to avoid accidental infection.

GEORGE SASLOW

Worcester State Hospital
Worcester, Massachusetts

BOOK REVIEW

In Search of Complications: An autobiography. By Eugene de Savitsch, M.D. Foreword by Arthur Krock. 8°, cloth, 396 pp. New York: Simon and Schuster, 1940. $3.00.

This is another in the seemingly endless list of medical autobiographies and memoirs that the last few years have produced. Dr. de Savitsch is a Russian whose life has been spent in his own country and Japan and the United States, where he studied medicine and where he practices. He has had some lively adventures, which he narrates with a certain verve, but the most interesting antedate his entry into medicine. Of the current Russia, which in the present status of world events one craves to know, nothing is said in this work. Dr. de Savitsch is a White Russian, and he has been away too long. The reviewer confesses to no more than a mild interest in this book; a jaded appetite for this type of literature (unless something really outstanding came along) may be responsible.

NOTICES

SOUTH END MEDICAL CLUB

A regular meeting of the South End Medical Club will be held at the headquarters of the Boston Tuberculosis Association, 554 Columbus Avenue, Boston, on Tuesday, November 18, at 12 noon.

Dr. H. Houston Merritt will speak on "Treatment of Epilepsy."

JOSEPH H. PRATT DIAGNOSTIC HOSPITAL

Bennet Street, Boston
Lecture Hall, 9–10 a.m.

MEDICAL CONFERENCE PROGRAM, NOVEMBER

Wednesday, November 12—The Dynamics of Nasal Respiration. Dr. H. J. Sternstein.

Friday, November 14—Some of the Disputed Points in the Treatment of Syphilis. Dr. W. P. Boardman.

Saturday, November 15 — Presentation and discussion of District and Boston Floating Hospital cases. Dr. P. Piccolo and Dr. Francis McDonald.
Wednesday, November 19 — Refractory Blood Diseases. Dr. C. W. Heath.
Friday, November 21 — Anemia and Hiatus Hernia. Dr. William P. Murphy.
Saturday, November 22 — Blood Clinic. Dr. H. G. Brugsch.
Wednesday, November 26 — What Happens to Alcoholics? Dr. Merrill Moore.
Friday, November 28 — Gold Therapy of Rheumatoid Arthritis. Dr. Charles L. Short.
Saturday, November 29 — Personal Experiences with Wartime Neuroses. Dr. Kurt Goldstein.

On Tuesday and Thursday mornings (except November 11 and November 20) from nine to ten o'clock, Dr. S. J. Thannhauser will give a medical clinic on hospital cases.

PETER BENT BRIGHAM HOSPITAL

Gordon Gordon-Taylor, O.B.E., M.A. (Aberd.), M.S., B.Sc. (Lond.), F.R.C.S., F.R.A.C.S. (hon.), senior surgeon to the Middlesex Hospital, London, and surgeon rear-admiral to the Royal Navy, will be surgeon-in-chief *pro tempore*, at the Peter Bent Brigham Hospital, Boston, from November 9 through November 15. All physicians are cordially invited to attend the regular hospital exercises in which he will participate, that is, the clinicopathological conference on Monday, November 10, at 12:15 p.m., the surgicopathological conference on Wednesday, November 12, at 4:00 p.m., and the joint Peter Bent Brigham Hospital — Children's Hospital rounds (at the Children's Hospital) on Thursday, November 13, at 8:30 a.m.

HARVARD MEDICAL SOCIETY

A meeting of the Harvard Medical Society will be held in the amphitheater of the Peter Bent Brigham Hospital on Wednesday, November 12, at 8:15 p.m.

PROGRAM

Clinical presentation.
Remarks Concerning Military and Naval Surgery. Mr. Gordon Gordon-Taylor, O.B.E., surgeon to Middlesex Hospital, London; surgeon rear-admiral to His Majesty's Navy; surgeon-in-chief *pro tempore*, Peter Bent Brigham Hospital.

Physicians and medical students are cordially invited to attend.

BOSTON DOCTORS' SYMPHONY ORCHESTRA

The Boston Doctors' Symphony Orchestra will rehearse, under Alexander Thiede, every Thursday at 8:30 p.m. at Station WMEX, 70 Brookline Avenue, Boston. Those interested in becoming members should communicate with Dr. Julius Loman, 520 Beacon Street, Boston (KEN 3200 or LON 2155).

MASSACHUSETTS DEPARTMENT OF CIVIL SERVICE AND REGISTRATION

Medical Inspector (Part-Time), Health Department, $2000 a year, Boston

Director of State Civil Service, Ulysses J. Lupien, has announced that a competitive examination is to be held on December 13, to find eligibles for appointment to the position of part-time medical inspector, Health Department, Boston.

The entrance requirement is as follows: applicants must be registered physicians under the Massachusetts Board of Registration in Medicine. The subject and weights of the examination are as follows: training and experience, 2; practical questions, 3; total, 5. To become eligible, applicants must obtain a grade of at least 70 per cent in each subject. The last date for filing applications is Saturday, November 22, at 12 noon.

NATIONAL COMMITTEE FOR MENTAL HYGIENE FELLOWSHIPS

A limited number of fellowships are being offered for training in extramural and child psychiatry. Initial selection for these fellowships is to be made by the National Committee for Mental Hygiene, and eligible applicants will be recommended for appointment in selected training clinics. These fellows will spend one or two years in a clinic, the term and plan of the fellowship to be determined by the peculiar needs of the applicant. The training is pursued according to a definite plan related to the probable future functions of these fellows. Candidates for fellowship award should have had at least a general internship and two years of psychiatry in an approved mental-hospital service, in addition to other qualities fitting them for extramural service. Since this provision of training fellowships comes in response to a definite paucity of personnel in this field, peculiarities of the demand are considered in making appointments. The stipends vary slightly with location and status of the fellow but in general range between $2000 and $2600.

Requests for further information about these fellowships, and applications therefor, should be addressed to Dr. Milton E. Kirkpatrick, National Committee for Mental Hygiene, 1790 Broadway, New York City.

SOCIETY MEETINGS AND CONFERENCES

CALENDAR OF BOSTON DISTRICT FOR THE WEEK BEGINNING SUNDAY, NOVEMBER 9

MONDAY, NOVEMBER 10
12:15–1:15 p.m. Clinicopathological conference. Peter Bent Brigham Hospital amphitheater.

TUESDAY, NOVEMBER 11
12:15–1:15 p.m. Clinicoroentgenological conference. Peter Bent Brigham Hospital amphitheater.

WEDNESDAY, NOVEMBER 12
*9:00–10.00 a.m. The Dynamics of Nasal Respiration. Dr. H. J. Sternstein. Joseph H. Pratt Diagnostic Hospital.
*12:00 m. Clinicopathological conference. Children's Hospital.
*8:15 p.m. Harvard Medical Society. Amphitheater, Peter Bent Brigham Hospital.

THURSDAY, NOVEMBER 13
*8:30 a.m. Combined clinic of the medical, surgical, orthopedic and pediatric services of the Children's Hospital and the Peter Bent Brigham Hospital, at the Children's Hospital. Conducted by Dr. Kenneth Blackfan.
*9:00–10:30 a.m. Medical clinic. Dr. S. J. Thannhauser. Joseph H. Pratt Diagnostic Hospital.

(Continued on page x)

there's a certain attraction

Minerals and vitamins seem to have an attraction for each other too. Vitamin D requirements are dependent upon the presence of calcium and phosphorus.[1] Vitamin D is also more effective, especially in tooth development, when vitamin A and these minerals are present.[2] Vitamin B_1 acts directly on mineral and total metabolism,[3] and vitamin A and iron are related in effects on the hematopoietic system.[4]

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HOBOKEN NEW JERSEY

1 Elvehjem, C. A. — Nutritional Requirements of Man — Ind. & Eng. Chem., June 1941.

2 McCollum, E. V. — The Newer Knowledge of Nutrition — 5th Ed., 1939, p. 392.

3 McLester, J. S. — Nutrition and Diet in Health & Disease — 3rd Ed., 1939, p. 91.

4 McCollum, E. V. — The Newer Knowledge of Nutrition — 5th Ed., 1939, p. 320.

FRIDAY, NOVEMBER 14

*9:00–10:00 a.m. Some of the Disputed Points in the Treatment of Syphilis. Dr. W. P. Boardman. Joseph H. Pratt Diagnostic Hospital.

12 m. Clinical staff meeting of the Children's Medical Service. Massachusetts General Hospital Ether Dome.

*8:15 p.m. The Modern Treatment of Pneumonia. Dr. Maxwell Finland. United States Naval Hospital, Chelsea.

SATURDAY, NOVEMBER 15

*9:00–10:00 a.m. Presentation and discussion of district and Boston Floating Hospital cases. Dr. P. Piccolo and Dr. Francis McDonald. Joseph H. Pratt Diagnostic Hospital.

*Open to the medical profession.

NOVEMBER 12–29. Joseph H. Pratt Diagnostic Hospital. Medical Conference Program. Page 762.

NOVEMBER 13. Pentucket Association of Physicians.

NOVEMBER 17–19, 21–22, 27 and 30. Thomas William Salmon Memorial Lectures. Page 636, issue of October 16.

NOVEMBER 18 — South End Medical Club. Page 761.

NOVEMBER 19. New England Oto-Laryngological Society. Page 708, issue of October 30.

JANUARY 3. American Board of Obstetrics and Gynecology. Page 473, issue of September 18.

JANUARY 10–11. Forum on Allergy. Page 392, issue of September 4.

FEBRUARY 19–21. American Orthopsychiatric Association. Page 708, issue of October 30.

APRIL 6–10. American Congress on Obstetrics and Gynecology. Page 606, issue of October 9.

APRIL 8–11. American Academy of Physical Medicine. Hotel Statler, Boston.

APRIL 20–24. American College of Physicians. Page 996, issue of June 5.

DISTRICT MEDICAL SOCIETIES

BERKSHIRE

APRIL 30.

BRISTOL NORTH

APRIL 16. Taunton.

ESSEX NORTH

JANUARY 7. Haverhill.

MAY 6. Lawrence.

ESSEX SOUTH

NOVEMBER 12. Beverly Hospital, Beverly.

DECEMBER 3. Salem Hospital, Salem.

JANUARY 7. Danvers State Hospital, Hathorne.

FEBRUARY 11. Lynn Hospital, Lynn.

MARCH 4. Essex Sanatorium, Middleton.

APRIL 1. Addison Gilbert Hospital, Gloucester.

MAY 13. Annual meeting (place to be announced).

FRANKLIN

NOVEMBER 11.

JANUARY 13.

MARCH 10.

MAY 12. Annual meeting.

Meetings will be held at the Franklin County Hospital at 11:00 a.m.

HAMPSHIRE

JANUARY 7. Belchertown State Hospital, 1:00 and 4:00 p.m.

MARCH 4. Hotel Northampton, Northampton, 4:30 and 6:30 p.m.

MAY 6. Hotel Northampton, Northampton, 8:30 p.m.

MIDDLESEX EAST

NOVEMBER 12.

JANUARY 28.

MARCH 18.

MAY 6.

All meetings will be held at 12:15 p.m. at the Bear Hill Golf Club, Stoneham, except that of May 6, which will be held at Woburn at 6:30 p.m.

MIDDLESEX NORTH

JANUARY 28.

APRIL 29.

NORFOLK

NOVEMBER 25.

JANUARY 27.

FEBRUARY 24.

MARCH 24.

MAY 1–15 (date to be announced).

All meetings will be held at the Hotel Sheraton, Boston.

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